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The family Pectinidae in South Africa and Mozambique (Mollusca: Bivalvia: Pectinoidea)

by

H. H. Dijkstra[1] and **R. N. Kilburn**[2]

([1]Zoological Museum, University of Amsterdam, P. O. Box 94766, 1090 GT Amsterdam, The Netherlands, h.h.dijkstra@wxs.nl; [2]Natal Museum, P. Bag 9070, Pietermaritzburg, 3200, South Africa, dkilburn@nmsa.org.za)

ABSTRACT

Of the 29 species of Pectinidae here recorded from South Africa and Mozambique, *ca.* 76% have Indo-West Pacific origins, 17% are of Mediterranean-West African origin and *ca.* 7% are probably of Southern Ocean origin.

New species: *Mirapecten tuberosus*, *Veprichlamys africana.*

New subspecies: *Aequipecten commutatus peripheralis.*

New synonyms: *Chlamys liltvedi* Wagner, 1984 = *Laevichlamys lemniscata* (Reeve, 1853). Genus *Karnekampia* Wagner, 1988 = *Pseudamussium* Mörch, 1853, *Somalipecten* Waller, 1996 = *Mirapecten* Dall, Bartsch & Rehder, 1938. *Perapecten* Wagner, 1985, and *Lindapecten* Petuch, 1995 = *Aequipecten* Fischer, 1886.

New records for South Africa: *Delectopecten musorstomi* Poutiers, 1981; *Anguipecten picturatus* Dijkstra, 1995; *Decatopecten amiculum* (Philippi, 1851); *D. plica* (Linnaeus, 1758); *Glorichlamys elegantissima* (Deshayes, 1863); *Gloripallium pallium* (Linnaeus, 1758); *Juxtamusium maldivense* (Smith, 1903); *Laevichlamys deliciosa* (Iredale, 1939), *L. lemniscata* (Reeve, 1853); *Pedum spondyloideum* (Gmelin, 1791); *Semipallium crouchi* (Smith, 1892); *S. flavicans* (Linnaeus, 1758); *Haumea minuta* (Linnaeus, 1758).

New combinations: *Chlamys gilchristi* Sowerby, 1904, to *Pseudamussium*; *Chlamys weberi* Bavay, 1904, to *Laevichlamys*; *Pecten coruscans* Hinds, 1845, to *Semipallium*; *Chylams* [*sic*] *humilis* Sowerby, 1904, and *Ostrea multistriata* Poli, 1795, to *Talochlamys.*

Lectotypes designated: *Pallium striatum* Schumacher, 1817; *Pecten velutinus* Sowerby, 1842; *Pecten strangei* Reeve, 1852.

INTRODUCTION

The family Pectinidae is well represented in South Africa, with 29 species and subspecies here reported. Prior to the last decade of the 19th century (see Sowerby 1892: 66) only two species had been recorded, namely *Pecten sulcicostatus* Sowerby, 1842, and (under various other names) *Talochlamys multistriata* (Poli, 1795), both from the Cape littoral. The dredging survey conducted by *s.s. Pieter Faure* in 1897–1901 added three benthic species (Sowerby 1904). Over the following few decades, amateur collectors added two further species (*Chlamys natalensis* Smith, 1906, and *Pecten eucosmia* Turton, 1932, although both names now fall into synonymy), plus the first records of Indo-Pacific taxa. As recently as 1964, Barnard enumerated only eight species of true Pectinidae as living in South Africa. A few subsequent records are scattered through the recent literature, bringing the previously recorded total to 13.

Over the last 30 years a very large quantity of Pectinidae has become available from the region, mainly taken from the benthic samples collected during the Natal Museum Dredging Programme (see Kilburn & Herbert 1994), but also by SCUBA and littoral collecting. This has enabled us to add to the South African fauna list not only a further 13 new records, but two new species and one subspecies.

Mozambique records are equally sparse and scattered through the literature; ignoring obvious misidentifications and allowing for synonyms, only five species have previously been recorded from that country, here increased to 12. This figure is certainly far too conservative, as several Indo-Pacific species are known from KwaZulu-Natal but not yet from Mozambique, where their presence is to be expected.

In this account we have largely followed the classification proposed by Waller (1986 1991 1993) and by Waller & Marincovich (1992).

BIOGEOGRAPHY

Of the 29 species of Pectinidae here reported from South Africa and Mozambique, 22 (*ca.* 76%) have Indo-West Pacific origins, five species (17%) are of Mediterranean-West African origin, and two (*ca.* 7%) have probable sister species/groups in temperate-water Australasia (suggestive of Southern Ocean origins). Only seven species (24% of the total) are wholly or largely endemic to southern Africa.

Approximately 62% of the Indo-West Pacific elements are apparently Recent incursives, whose previous latitudinal ranges during interglacial maxima probably extended further into KwaZulu-Natal, but which have left no known fossil record. Within South African limits, this scallop fauna is typically associated with two biomes: (1) a series of offshore sandstone reefs (the remnant of a Late Pleistocene dune ridge) that runs parallel to the KwaZulu-Natal coast in 9–35 m, and (2) the adjacent outer continental shelf (at depths of 30–80 m), which consists mainly of sand with coral, sandstone rubble and live sponges. A few species range onto the upper continental slope down to *ca.* 100 m. Off northern Zululand, the offshore sandstone ridge bears a veneer of reef coral communities, with which are associated a number of tropical pectinids; these here reach their southernmost limits (except for a few 'vagrant' individuals which have been collected further south). These species are *Anguipecten picturatus*, *Decatopecten amiculum*, *D. plica*, *Gloripallium pallium*, *Juxtamusium maldivense*, *Bractechlamys nodulifera*, and *Pedum spondyloideum* (the latter an obligate symbiont living inside reef corals). Further north, in the calmer, warmer water of Mozambique, at least 10 of these species live in the lower intertidal, particularly in beds of *Thalassodendron* grass. Further south, the ranges of at least four of these Indo-Pacific incursives extend into southern KwaZulu-Natal. Of these, *Laevichlamys lemniscata* lives mainly on the Aliwal Shoal (a remnant of the offshore dune ridge) in 10–30 m, *Glorichlamys elegantissima* and *Laevichlamys deliciosa* mainly on the shelf beyond the Aliwal Shoal, as deep as 100 m, and *Mimachlamys sanguinea* ranges into southern KwaZulu-Natal, with a fresh valve dredged off Transkei indicative of a outlying population or vagrant individual living that far south.

The remaining three species of Indo-Pacific origin are here regarded – somewhat doubtfully – as essentially south-east African endemics. Of these, *Volachlamys fultoni* is associated with shallow, fluvial-mud substrata (such as form the Tugela and Mzimvubu Banks), which being of limited occurrence off south-east Africa, has probably contributed to its genetic isolation and vicariance. This species also inhabits similar biomes in southern and central Mozambique. *Pecten afribenedictus*, on account of its subtropical distribution, is here viewed as a probable sister species of the Red Sea *Pecten erythraeensis* Sowerby, 1842, although molecular studies are needed to confirm whether it is phylogenetically closer to this or to the temperate-water Australian *P. fumatus*

Reeve, 1842. Such elements may have evolved from populations temporarily isolated from their tropical Indian Ocean ancestors/sister species during Late Tertiary/Quaternary lowstands, when exposure of the narrow Zululand shelf presumably imposed a filter-route on southward larval dispersal. *Laevichlamys weberi* may have a different origin as its known range extends to tropical East Africa.

Of undoubted Atlantic elements, *Delectopecten vitreus* is typically a boreal/North Atlantic species that reaches its southern limits on the continental slope of the Cape west coast. *Pseudamussium gilchristi*, the only other pectinid inhabiting the Atlantic Cape slope, is endemic, although probably a sister species of *P. alicei* (Dautzenberg & Fischer, 1897) of the eastern Atlantic (Azores to Namibia), sharing with it similar macro- and microsculpture and valve outline and convexity. *Talochlamys multistriata*, on the other hand, is one of several shallow shelf and sublittoral bivalves of apparent Mediterranean-West African origin, which during Quaternary warm periods established morphologically indistinguishable populations along the southern Cape coast. Although there may be a narrow hiatus in present distribution along the Atlantic Cape/Namibian coast, the populations would certainly have been continuous during Pleistocene interglacial periods and even during the mid-Holocene hypsithermal. The fourth scallop of presumed Mediterranean/West African origin, *Pecten sulcicostatus* (*q.v.*), has a very similar sister species in the Eastern Atlantic, *Pecten maximus* (Linnaeus, 1758), although the wide disjunction between the modern ranges of the two suggests that vicariance predated the Pleistocene. As Kilburn (1999) observed 'Although confirmation from the West African fossil record is obviously desirable, there is merit in Vermeij's (1992) suggestion, on the basis of various other molluscs with similar widely disjunct populations, that such trans-equatorial distributions were established "most likely during the Early Pliocene"'. Such an early origin is presumably the case with *Aequipecten commutatus peripheralis* from the continental slope of Transkei and KwaZulu-Natal; its nominate subspecies is a Mediterranean-West African taxon, whose present range reaches a southern limit in the Cape Verde-Senegal region. This is one of the few east coast South African molluscs with obvious relict Atlantic origins.

Finally, of the remaining South African Pectinidae two species – *Veprichlamys africana* and *Talochlamys humilis* – are considered probable Southern Ocean elements. Grounds in the case of *V. africana* are the absence of the genus *Veprichlamys* from both the Atlantic and the Indian Ocean, and the resemblances in outline and sculpture between *V. africana* and *V. kiwaensis* (Powell, 1933) of New Zealand and *V. perillustris* (Iredale, 1925) of temperate-water eastern Australia, suggesting that they belong within the same clade. *Talochlamys humilis* shares closer sculptural similarity with *T. pulleineana* (Tate, 1887) from southern and eastern Australia than with its only two Atlantic congeners, *T. multistriata* of the Eastern Atlantic and South Africa, and *T. multicolor* (Melvill & Standen, 1907) from Gough Island, and is thus more likely to be a sister species of *T. pulleineana*.

ABBREVIATIONS

AIM	Auckland Institute and Museum, Auckland
AMS	Australian Museum, Sydney
BMNH	The Natural History Museum, London
CM	Christchurch Museum, Christchurch
HD	H. H. Dijkstra collection, Sneek

ICZN	International Code of Zoological Nomenclature
IOAS	Institute of Oceanology, Academia Sinica, Qingdao
KBIN	Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels
KZNW	KwaZulu-Natal Wildlife (formerly Natal Parks Board, NPB)
LMA	Löbbecke Museum und Aquarium, Düsseldorf
LSL	Linnean Society of London, London
MHNG	Muséum d'Histoire Naturelle, Geneva
MNHB	Museum für Naturkunde an der Humboldt-Universtät, Berlin
MNHN	Muséum National d'Histoire Naturelle, Paris
MNHNS	Museo Nacional de Historia Natural, Santiago
MOM	Musée Océanographique de Monaco, Monaco
MSNP	Museo di Storia Naturale e del Territorio, Calci
NMDP	Natal Museum dredging programme
NMSA	Natal Museum, Pietermaritzburg
NMW	National Museum of Wales, Cardiff
NNM	Naturalis, Nationaal Natuurhistorisch Museum, Leiden
NSMT	National Science Museum, Tokyo
OUZM	Oxford University Museum (Zoological Collections), Oxford
SAM	South African Museum, Cape Town
TMAG	Tasmanian Museum & Art Gallery, Hobart
USNM	National Museum of Natural History, Smithsonian Institution, Washington D.C.
UUZM	University of Uppsala, Zoological Museum, Uppsala
ZMA	Zoölogisch Museum, Amsterdam
ZMUC	Zoologisk Museum, Copenhagen
ZMUO	Zoologisk Museum, Oslo
comb. n.	new combination
D	depth (both valves together)
H	height (dorsal to ventral margin of the shell)
L	length (anterior to posterior margin of the shell)
LV	left (upper) valve
PV	paired valves
RV	right (lower) valve
HD	H. Dijkstra
RK	R. Kilburn

'Natal' refers to that part of the province of KwaZulu-Natal south of the Tugela River, and 'Zululand' to the region from the Tugela River north to the Mozambique border. The term 'eastern Cape' refers not to the province of that name but to the region from the Kei River west to the Tsitsikamma area.

TAXONOMY

Family Pectinidae Wilkes, 1810

[as Pectinoidae, emend. Waller, 1978]

Attempts at producing a dichotomous key to the 20 genera of the Pectinidae occurring within the region covered proved unsuccessful on account of the variability of many characters within most genera, and the difficulty of defining degree of development of such characters. Instead, brief diagnoses of generic characters are summarised below, using shell characters. Similarly, descriptions of species have been reduced to diagnostic characters, so that separate diagnoses are not presented.

Synopsis of genera of Pectinidae in South Africa and Mozambique:

Delectopecten: Convex, fragile, inequivalve, equilateral, nearly orbicular, attains 30 mm in height, valves sculptured with commarginal rows of scales or vesicles, spinose radial ridges and/or delicate antimarginal striae, auricles unequal in size, byssal notch well-developed, ctenolium prominent.

Pseudamussium: Convex, fairly solid, inequivalve, slightly equilateral, nearly orbicular, attains 60 mm in height, valves with radial plicae or costae, sculptured with delicate to prominent radial ridges and/or radial striae, antimarginal microsculpture, auricles unequal in size, byssal notch shallow, ctenolium present.

Anguipecten: Convex, solid, inequivalve, slightly equilateral, suborbicular to elongate, laterally compressed, attains 70 mm in height, valves with 9–40 regularly spaced radial lirae, sculptured with delicate, closely spaced, commarginal lamellae, auricles more or less equal in size, byssal notch obsolete, ctenolium weak.

Bractechlamys: Convex, solid, inequivalve, equilateral, suborbicular to elongate, attains 60 mm in height, valves with 8–15 regularly spaced primary radial lirae, sometimes with nodules, secondary radial riblets present, prominently ribbed auricles unequal to subequal in size, byssal notch relatively deep, ctenolium weak.

Decatopecten: Convex, solid, inequivalve, juvenile equilateral, adult slightly inequilateral, suborbicular to elongate, attains 120 mm in height, valves with 5–15 regularly spaced primary radial lirae, closely spaced commarginal lamellae, delicate antimarginal microsculpture in early ontogeny and secondary radial sculpture in late ontogeny, byssal notch small, ctenolium weak.

Glorichlamys: Convex, solid, inequivalve, equilateral, suborbicular to elongate, attains 25 mm in height, valves with regularly to irregularly spaced radial lirae, simple to quadripartite, commarginal interstitial lamellae, auricles very unequal in size, byssal notch deep, ctenolium well developed.

Gloripallium: Convex, solid, inequivalve, equilateral, orbicular to suborbicular, attains 100 mm in height, valves with 7–14 regularly spaced primary radial lirae with prominent commarginal lamellae, secondary radial riblets (sometimes lacking), auricles unequal in size, noduliferous antimarginal macrosculpture on auricles, commarginal microsculpture on auricles and in early growth stages, byssal notch deep, ctenolium well developed.

Juxtamusium: Inflated, left valve nearly flat, right valve convex, rather fragile, equilateral to inequilateral, orbicular to suborbicular, attains 30 mm in height, valves with regularly to irregularly closely-spaced, weak radial lirae or riblets, delicate commarginal microsculpture throughout ontogeny, auricles nearly equal in size, resilifer on one side strongly erect, byssal notch shallow, ctenolium on both valves.

Mirapecten: Inflated, right valve more convex than left valve, solid to rather fragile, equilateral to inequilaterial, orbicular to suborbicular, attains 40 mm in height, valves with 5–7 regularly spaced primary squamous lirae to 7–11 irregularly spaced primary and secondary lirae, auricles unequal in size, microsculpture of closely spaced commarginal lamellae, byssal notch moderately deep, ctenolium well developed.

Pecten: Left valve almost flat, right valve strongly convex, solid, equilateral, orbicular to suborbicular, attains 150 mm in height, valves with radial macrosculpture and commarginal microsculpture, auricles almost equal in size, byssal notch weak, ctenolium weak in juvenile and absent in adult.

Laevichlamys: Weakly convex, solid, inequivalve, inequilateral, elongate, attains 60 mm in height, valves with delicate radial ribs or riblets (irregularly or regularly spaced), shagreened or reticulate microsculpture secondarily commonly lacking, intercalated antimarginal striae, commarginal lirae absent, byssal notch deep, ctenolium well developed.

Pedum: Solid, flattened left valve, convex right valve, dorsoventrally elongate, attains 100 mm in height, microsculpture of numerous scabrous radial riblets and closely spaced commarginal lamellae, anterior auricle in late ontogeny strongly curved, posterior nearly lacking, byssal notch deep, ctenolium present in immature, lacking in adult; living embedded in coral.

Semipallium: Weakly convex, solid, inequivalve, equilateral to inequilateral, elongate, up to 70 mm in height, regularly or irregularly spaced strong to weak primary radial lirae or costae, delicate secondary radial riblets commonly in late ontogeny, shagreened or reticulated microsculpture throughout ontogeny, auricles very unequal in size, byssal notch deep, ctenolium well developed.

Talochlamys: Rather inflated, weakly convex, solid to fragile, inequivalve, equilateral to inequilateral, elongate, attains 40 mm in height, valves with irregularly spaced primary radial squamous costae, secondary interstitial riblets in late ontogeny, microsculpture of weak antimarginal striae, intercalated widely spaced prominent commarginal lamellae, shagreened microsculpture commonly lacking, byssal notch deep, ctenolium well developed.

Veprichlamys: Rather inflated, weakly convex, rather fragile, inequivalve, inequilateral, elongate, attains 40 mm in height, valves with preradial antimarginal microsculpture, squamous primary and secondary intercalated (commonly in late ontogeny) radial macrosculpture, interstitial antimarginal microsculpture (rarely reticulate), byssal notch deep, ctenolium well developed.

Mimachlamys: Convex to rather inflated, solid, inequivalve, slightly equilateral, suborbicular to elongate, attains 100 mm in height, valves with preradial granulated microsculpture, macrosculpture commonly of regularly spaced, solid radial costae with spines, flanked with secondary costellae, antimarginal and/or divaricating interstitial microsculpture, byssal notch deep, ctenolium well developed.

Aequipecten: Convex to rather inflated, solid, inequivalve, slightly equilateral, orbicular to suborbicular, attains 80 mm in height, valves with preradial granulated microsculpture, macrosculpture of regularly spaced, radial costae, in early radial stage ventrally concave commarginal lamellae on rib flanks, auricles unequal in size, interstitial shagreened or 'herringbone' microsculpture lacking, byssal notch moderately deep, ctenolium present.

Cryptopecten: Very variable in convexity, solid, inequivalve, inequilateral, orbicular to suborbicular, attains 30 mm in height, valves with 12–25 radial costae, commonly lamellose, interspaces with delicate imbricated scales, auricles unequal in size, byssal notch moderately deep, ctenolium well developed.

Haumea: Left valve flattened and right valve strongly convex, solid, equilateral to inequilateral, nearly orbicular, attains 30 mm in height, macrosculpture of regularly spaced radial lirae, delicate closely spaced commarginal lamellae throughout ontogeny, auricles moderately small and nearly equal in size, byssal notch deep, ctenolium present.

Volachlamys: Rather flattened, convex, solid, inequivalve, nearly equilateral, orbicular to suborbicular, attains 60 mm in height, macrosculpture of regularly spaced prominent radial lirae and commarginal lamellae throughout ontogeny, intercalated imbricate microsculpture in early radial stage, weak intercalated radial microsculpture in late ontogeny (also lacking), byssal notch deep, ctenolium well developed.

Subfamily Camptonectinae Habe, 1977
[emend. Waller & Marincovich, 1992]

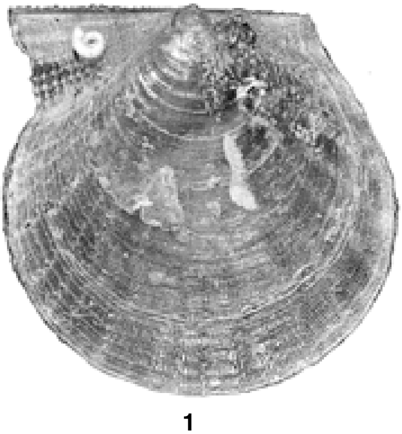
Genus *Delectopecten* Stewart, 1930

Delectopecten Stewart, 1930: 118. Type species (OD): *Pecten* (*Pseudamusium*) [*sic*] *vancouverensis* Whiteaves, 1893; Recent, Vancouver Is., Canada.

Delectopecten musorstomi Poutiers, 1981
(Figs 1–2)

Delectopecten musorstomi Poutiers, 1981: 331, pl. 1, figs 2–3; Dijkstra & Marshall, 1997: 88, pl. 8, figs 1–6 (type data, distribution, discussion); Dijkstra & Knudsen, 1998: 51, pl. 7, figs 31–32. Type locality: Philippines, N of Lubang, 13°57' N, 120°16.5' E, 150–159 m.

Description: Shell fragile, height to *ca.* 5 mm, orbicular, equivalve, equilateral, anterior auricle slightly larger than posterior, umbonal angle *ca.* 120°. Prodissoconch height *ca.* 200 µm. Both valves sculptured with minute antimarginal radial striae and 14–20 fine, irregularly spaced, scaly radial lirae, plus fine regularly spaced, somewhat crenulated, commarginal growth lines; scales often damaged. External sculpture visible from the interior. Auricles continuous with disc and similarly sculptured. Anterior auricle of RV separated from disc by distinct suture, with 4–5 radial ridges and concentric lamellae, the latter strongly developed at dorsal margin. Hinge line straight. Byssal fasciole and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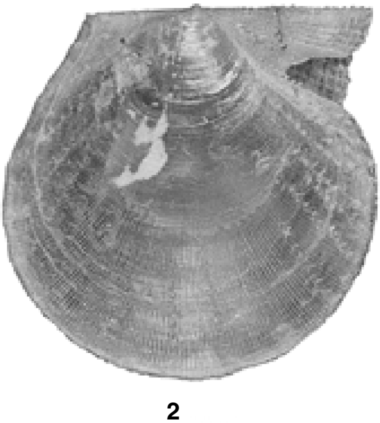
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Figs 1–2. *Delectopecten musorstomi* Poutiers, 1981: NMSA C910, off Mtamvuna R., Transkei, 143 m, pv, 6.1 x 6.1 mm. 1. LV exterior. 2. RV exterior.

notch well developed. Active ctenolium with 2–3 teeth. Resilifer triangular. Valves transparent white, sometimes with white dots.

Type material: Holotype, MNHN (not registered), examined by HD.

Regional data: SOUTH AFRICA (all NMDP): *Zululand*: Sodwana Bay, 100 m, dead (A5823). *S Natal*: off Amanzimtoti, 300–305 m, medium sand, live (D1301); off Park Rynie, 140 m, sponge rubble, live (B3864); same loc., 136 m, sponge rubble, live (B3898); off Port Shepstone, 70 m, eroded shell, sponge rubble, live (B3672). *Transkei*: off Mtamvuna R., 111 m, sponge, live (E15); same loc., 120–140 m, live (E69); same loc., 140 m, sponge rubble, live (C817); same loc., 143 m, sponge rubble, live (C910); off Rame Head, 150–160 m, sponges, live (C1904); off Port Grosvenor, 110–115 m, sand, some mud, solitary corals, shells, dead (C1346).

Distribution: Philippines and Indonesia to New Caledonia and Norfolk Island (Dijkstra & Marshall 1997), here extended to the Transkei shelf of South Africa.

Habitat: Sublittoral to bathyal, living byssally attached amongst sponge rubble on soft sediments (mud, sandy mud or muddy sand).

Remarks: South African specimens agree well with the holotype of *D. musorstomi*. This species is much smaller than either the Atlantic *Delectopecten vitreus* (Gmelin, 1791) or the Indo-Pacific *D. alcocki* (E. A. Smith, 1904), not exceeding about 5 mm in height against about 20 and 22 mm respectively. Juveniles of *D. vitreus* and *D. alcocki* can be distinguished from *D. musorstomi* by the absence of scaly radial lirae near the ventral margin. *D. musorstomi* is a new record for South Africa.

Delectopecten vitreus (Gmelin, 1791)

(Figs 3–4)

Ostrea vitrea Gmelin, 1791: 3328; Dillwyn, 1817: 263. Type locality: 'Oceano septentrionali' (= 'Norwegen, Island und Grönland' *fide* Chemnitz, 1784).

Pecten vitreus; Locard, 1888: 135 (varieties).

Palliolum vitreum; Barnard, 1962: 254; *idem*, 1963: 5, 14; *idem*, 1964: 431 (in part); 1974: 761.

Delectopecten vitreus vitreus; Nordsieck, 1969: 47, pl. 7, fig. 31.10.

Chlamys (*Delectopecten*) *vitrea*; Tebble, 1976: 64, textfigs 27A–B.

Delectopecten vitreus; Lucas, 1979: 18, figs; Waller, 1984: 208, figs 3d–e; Wagner (1991): 13, textfig. 5 (synonyms, variation); Poppe & Goto, 1993: 65, pl. 9, fig. 7.

Cyclopecten (*Delectopecten*) *vitreus*; Rombouts, 1991: 78, pl. 27, fig. 3; Lussi, 1995: 2, 12, fig. 20.

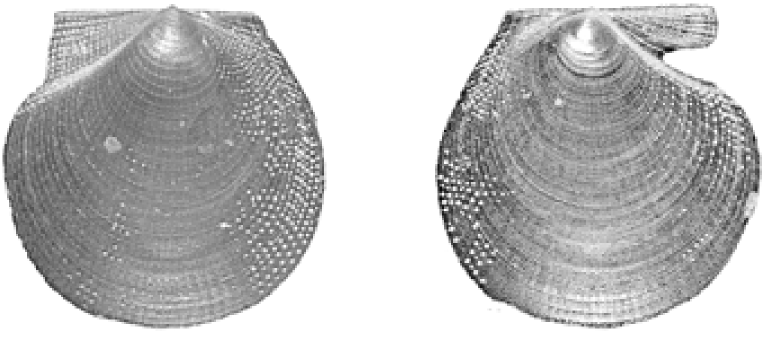
Chlamys papyracea Röding, 1798: 164. Type locality: not given [= 'Drontheim' (= Trondheim, Norway) *fide* Chemnitz, 1784].

Pecten gemmellari filii Biondi, 1859: 118, pl. 1, fig. 4. Type locality unknown.

Pecten abyssorum [Lovèn] G. O. Sars, 1878: 22, pl. 2, figs 6a–c; Küster & Kobelt, 1888: 241, pl. 63, figs 6–7. Type locality: Lofoten, 300 fath. (549 m), Sognefjord, 650 fath. (1189 m), Christianifjord (= Oslofjord), 230 fath. (421 m).

Chlamys chaperi Dautzenberg & H. Fischer, 1897: 190, pl. 5, figs 5–8. Type locality: Azores, 38°31'N, 26°09'30" W, 845 m; 39°11'N, 32°44' 30'W, 1600 m.

Description: Shell to *ca.* 20 mm high, suborbicular (usually higher than wide), RV slightly more convex than LV, inequilateral, auricles unequal (posterior larger than anterior), umbonal angle *ca.* 80–90°. Both valves sculptured with commarginally crenated growth lines with vesicular tubercles, except on anterior auricle of RV, which has 5–6 lamellose radial riblets. Posterior auricles weakly defined. Microsculpture of antimarginal striae throughout ontogeny, sometimes only in early growth stages. Postero-dorsal margin spiny or tuberculated. Hinge line straight. Byssal fasciole broad, byssal



Figs 3–4. *Delectopecten vitreus* (Gmelin, 1791): NMSA K3886, off Walvis Bay, Namibia, *ca.* 200 m, pv, 13.9 x 13.9 mm. 3. LV exterior. 4. RV exterior.

notch moderately deep. Active ctenolium with 3–6 teeth on suture. Auricular crura weak. Resilifer triangularly oblique. Colour dull translucent white or hyaline.

Type material: *O. vitrea*: 10 syntypes ZMUC (not registered); seen by HD. *C. papyracea*: syntype ZMUC (not registered), seen by HD. *P. abyssorum*: syntypes ZMUO (not traced). *P. gemmellari filii*: not traced. *C. chaperi*: syntypes MOM 28.0148–9, seen by HD.

Regional data (both NMSA): SOUTH AFRICA: *Atlantic Cape*: off Saldanha Bay, 308–310 m, green mud (V270). NAMIBIA: off Walvis Bay, *ca.* 200 m, *ex pisce* (K3886: S. Whatmough).

Distribution: Arctic Ocean, NW and E Atlantic to off west coast of South Africa.

Habitat: Sublittoral to abyssal depths, usually byssally attached to rocks, stones, gorgonians or hydroids on a substratum of soft sediments (mud or muddy sand).

Remarks: Some authors (e.g. Grau 1959; Rombouts 1991; Wagner 1991) include *Pseudamussium gelatinosum* Rochebrune & Mabille, 1889, from southern Argentina and southern Chile, in the synonymy of *D. vitreus.* Morphologically *D. gelatinosus* is more similar to *D. fosterianum* (Powell, 1933) of S Australia, New Zealand and the Pacific-Antarctic Ridge (Dell 1990: 36). Although Barnard (1964: 431) synonymised *Pecten alcocki* E. A. Smith, 1904, of the Indo-West Pacific with *D. vitreus,* Knudsen (1967: 283) clearly differentiated the two species.

Subfamily Pectininae Wilkes, 1810

Tribe Palliolini Waller, 1991

Genus *Pseudamussium* Mörch, 1853

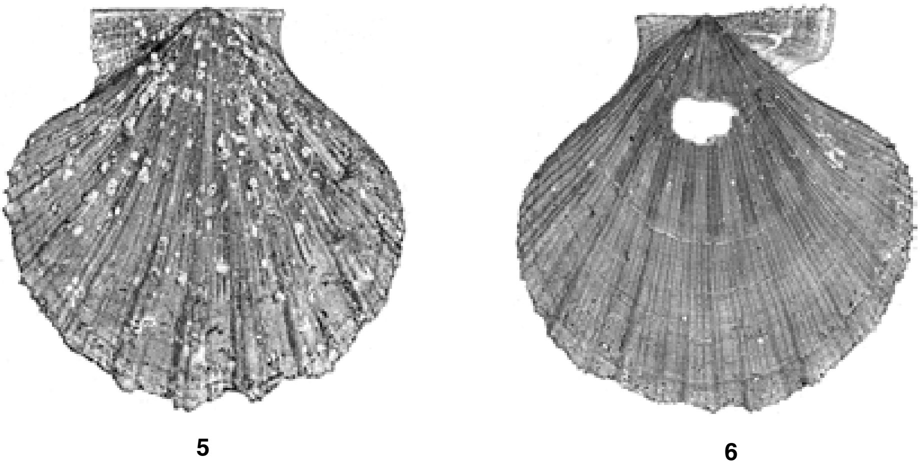
Pseudamussium Mörch, 1853: 59. Type species (ICZN Opinion 714, 1964): *Pecten septemradiatus* Müller, 1776 (= *Ostrea peslutrae* Linnaeus, 1758, see Dijkstra 1999: 427); Recent, Denmark.

Karnekampia Wagner, 1988: 41. Type species (OD) *Pecten bruei* Payraudeau, 1826 (= *Pecten sulcatus* Müller, 1776), Recent, E Atlantic and Mediterranean. **Syn. n.**

Pseudamussium gilchristi (G. B. Sowerby 3rd, 1904), **comb. n.**

(Figs 5–6)

Chlamys gilchristi Sowerby, 1904: 1, pl. 7, fig. 6; E. A. Smith, 1906: 59; Barnard, 1964: 427; *idem*, 1974: 761; Lussi, 1995: 2, 12, fig. 16. Type locality: 18.5 miles off Vasco da Gama Peak, N 71°E (should be read as S 71°W), 230 fath. (421 m), stones.



Figs 5–6. *Pseudamussium gilchristi* (Sowerby, 1904): NMSA E3100, Agulhas Bank, 200 m, pv, 30.8 x 31.1 mm. 5. LV exterior. 6. RV exterior.

Karnekampia gilchristi; Wagner, 1988: 42, fig. 3 (holotype refigured); *idem*, (1991): 20.
Chlamys (*Chlamys*) *gilchristi*; Rombouts, 1991: 12, pl. 24, fig. 2.

Description: Shell up to *ca.* 35 mm high, suborbicular, RV somewhat more convex than LV, equilateral, auricles unequal, umbonal angle *ca.* 90°. LV sculptured with 8 rounded primary radial lirae, RV with 9 broader and flatter primary radial lirae and numerous granulose secondary radial ribs (LV with 3 on main ribs, 4 interstitial; RV with 5 on main ribs, 2 interstitial) with very fine and close-set radial riblets near ventral margin, covered with a periostracal layer (often damaged in adult stages). Microsculpture in early ontogeny of antimarginal striae, more prominent near anterior and posterior margins. Anterior auricle of LV with 4–6 lamellose radial and concentric ribs (cancellated in early ontogeny), on posterior with 3–4 weaker granulose radial riblets. Hinge line straight. Byssal fasciole rather broad, byssal notch narrow, active ctenolium with 5–7 teeth on suture. Auricular crura small, resilifer triangular. Colour orange or pinkish, internally glossy orange-yellow or reddish-orange.

Type material: Holotype SAM 14853 (seen by HD).

Regional data (all NMSA unless otherwise stated): NAMIBIA: off Walvis Bay, *ca.* 200 m, trawled, attached to old netting & ropes, live (K3888: S. Whatmough). SOUTH AFRICA: *Atlantic Cape*: off Cape Columbine, trawled, dead (B6700: R. Cruickshank); 26 km W of Kleinzee (S of Port Nolloth), 130 m, dead (E7221: J. Pether); 31°14'S; 16°36'E, 272 m (SAM).

Unconfirmed: A*gulhas Bank*: off Port Elizabeth, 200 m, trawled in mud balls, dead (E3100: S. Whatmough).

Distribution: Continental shelf of Namibia and Atlantic Cape.

Habitat: Bathyal depths (*ca.* 130–420 m), substrate not established.

Remarks: Wagner (1988: 42) referred *P. gilchristi* to his new genus *Karnekampia*, whose characters essentially agree with those of *Pseudamussium*.

Tribe Decatopectinini Waller, 1986

Genus *Anguipecten* Dall, Bartsch & Rehder, 1938

Anguipecten Dall, Bartsch & Rehder, 1938: 92. Type species (OD): *Anguipecten gregoryi* Dall, Bartsch & Rehder, 1938 (= *Pecten lamberti* Souverbie *in* Souverbie & Montrouzier, 1874); Recent, Hawaii.

Anguipecten picturatus Dijkstra, 1995

(Fig. 7)

Pecten aurantiacus A. Adams & Reeve, 1850 (*non* Röding, 1798, *nec* J. Sowerby, 1820, *nec* Defrance, 1825): 74, pl. 21, fig. 12; Reeve, 1853: pl. 26, fig. 105. Type locality: 'China Sea' (herein emended to South China Sea).

Anguipecten lamberti (*non Pecten lamberti* Souverbie *in* Souverbie & Montrouzier, 1874); Abbott & Dance, 1982: 312, fig.; Higo & Goto, 1993: 576.

Anguipecten picturatus Dijkstra, 1995*b*: 17 (*nomen novum* for *Pecten aurantiacus* Adams & Reeve, *1850, non* Röding, 1798); 1998: 14, pl. 2, fig. 1 (references, type data, distribution, discussion).

Description: Shell up to *ca.* 50 mm high, usually *ca.* 40 mm, solid, oblong, sometimes oblique, inequilateral, auricles small and slightly unequal, umbonal angle 85–90°. Both valves somewhat compressed, RV more convex, with 12–14 regularly placed primary radial costae, on RV somewhat broader than on LV, secondary squamose radial riblets on entire disc in late radial stage, rib intervals on LV somewhat broader than on RV, commarginal lamellae in early radial stages. Auricles with fine radial riblets near disc flank, on posterior more prominent. Hinge small, straight. Byssal notch and fasciole weak. Active ctenolium with 2–4 small teeth. Resilifer elongate, triangular. Auricular crura strongly developed. Inner surface slightly plicated. Colour variable, valves marbled with yellow, rose, orange, pink, RV somewhat paler than LV.

Type material: Holotype BMNH 1950.11.14.8; seen by HD.

Regional data: SOUTH AFRICA: *Zululand*: off Rocktail Bay, 100 m, sand, dead (NMSA: S5160).

Distribution: Throughout the Indo-West Pacific from S Japan to N Australia and W Indian Ocean, as far south as northern Zululand.

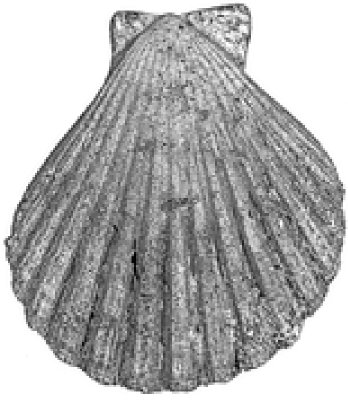


Fig. 7. *Anguipecten picturatus* Dijkstra, 1995: NMSA S5160, off Rocktail Bay, Zululand, 100 m, 39.7 x 36.8 mm, RV exterior.

Habitat: Living free amongst coral rubble or under coral slabs on sandy bottoms, usually littorally.

Remarks: The present specimen from Zululand agrees with the type material of *Pecten aurantiacus.* This is a new record for South Africa, although no live examples are yet known from the region.

Genus *Bractechlamys* Iredale, 1939

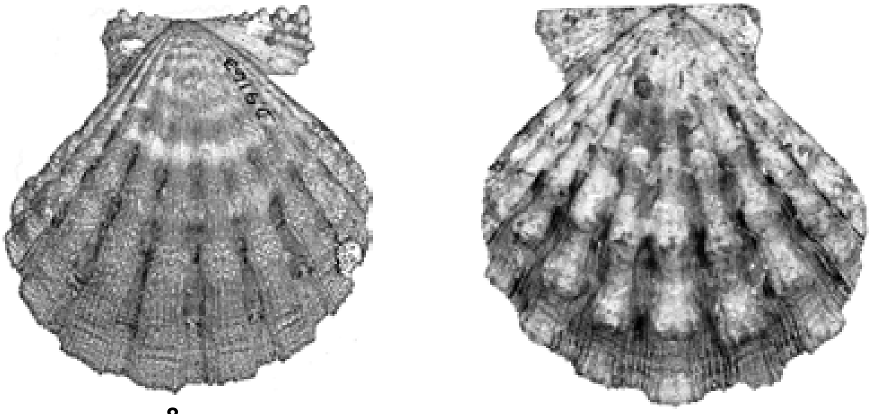
Bractechlamys Iredale,1939: 366. Type species (OD): *Bractechlamys evecta* Iredale, 1939 (= *Pecten vexillum* Reeve, 1853); Recent, N Queensland.

Bractechlamys nodulifera (G. B. Sowerby 2nd, 1842)

(Figs 8–9)

Pecten noduliferus Sowerby, 1842: 64, pl. 13, figs 38–39, pl. 16, fig. 94; von Martens, 1880: 313. Type locality: not given (= Mauritius, here designated).
Chlamys (*Nodipecten*) *nodulifer*; Lamy, 1935: 312.
Chlamys noduliferus; Smith, 1910: 212.
Nodipecten noduliferus; Grau, 1959: 128; Oliver, 1982: 13; Rombouts, 1991: 47, pl. 16, figs 6–6a; Wagner (1991): 24.
Pecten (*Nodipecten*) *noduliferus* (in part); Boshoff, 1965: 133, pl. 13, fig. 2.
Decatopecten noduliferus; Abbott & Dance, 1982: 307, fig.
Bractechlamys noduliferum; Waller, 1986: 41.
Lyropecten noduliferus; Anonymous 1991: 2, fig. 1.
Pecten corallinoides (*non* d'Orbigny *in* Webb & Berthelot, 1839); Reeve, 1852: pl. 6, fig. 27.
Chlamys corallinoides (*non* d'Orbigny); Bosch & Bosch, 1982: 160, fig.

Description: Shell up to 50 mm high, adult height usually *ca.* 30 mm, solid, RV slightly more convex than LV, equilateral, suborbicular, auricles unequal, umbonal angle *ca.* 90°. Both valves with prominent regularly placed, somewhat undulated and nodose, radial costae (9); secondary radial riblets on costae (4–9), starting in central part of disc and sometimes very weak, due to noduliferous character of costae; also present in intervals (2–5) and strongly developed near ventral margin. Disc covered with closely spaced microscopic commarginal lamellae. Anterior auricle larger than posterior, with radial riblets (*ca.* 4–8), slightly weaker on posterior auricle. Auricle of RV with strong,



Figs 8–9. *Bractechlamys nodulifera* (Sowerby, 1842): NMSA D9163, off Boteler Point, Zululand, 50 m, pv, 37.2 x 37.1 mm. 8. LV exterior. 9. RV exterior.

squamose sculpture on antero- and postero-dorsal margins. Hinge line straight. Byssal fasciole moderately wide, byssal notch rather deep. Active ctenolium with 3–7 teeth on suture. Resilifer elongate, triangular. Auricular crura well developed. Inner surface near ventral margin plicated. Colour variable, often vivid red, pink or brown with cream, yellow or white spots, sometimes more uniform in colour. Interior whitish and reddish, near dorsal margin sometimes also brownish.

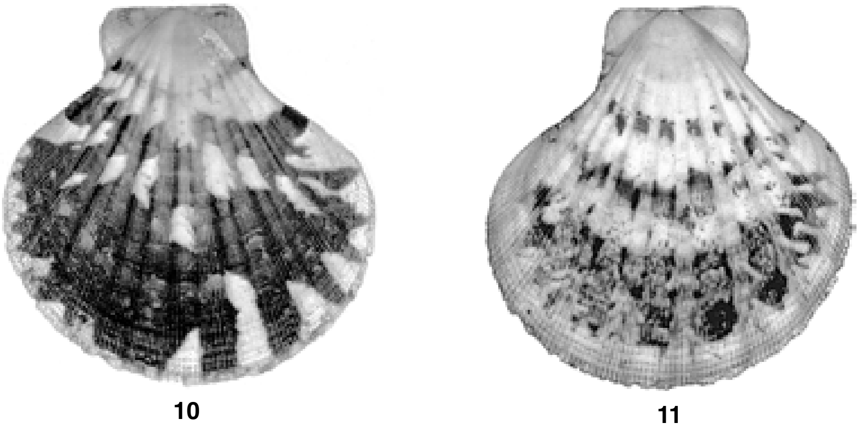
Type material: Not traced in the BMNH type collection, nor in their general collection.

Regional data: MOZAMBIQUE: Fernao Veloso Bay, Nacala, 2–3 m, amongst rubble, algae, dived, live (HD3712); SW Memba Bay, 0.6 m below LST, on *Thalassodendron* (NMSA H4471); Mozambique Bay, S Chembas, 2 m, rocky, *Thalassodendron* (NMSA H4470: K. J. Grosch); SW Lunga Bay, 0.6 m, in *Thalassodendron* (NMSA H4472: K. J. Grosch); SW Conducia Bay, E of Conducia, 0.6 m, sand flats, on *Thalassodendron* (NMSA H4469: K. J. Grosch); Conducia Bay (NMSA H4474: K. J. Grosch); Inhambane Bay, dead (NMSA H7425: B. J. Young); Cabo dos Correntes, 30–45 m, rubble, muddy sand, trawled, live (HD 6442); off Quissico, 110–150 m, juv. (L4770: J. Rosado). SOUTH AFRICA (all NMSA: NMDP, unless otherwise stated): *Zululand*: Kosi Bay, main reef, 1–4 km S of mouth, 18–22 m, dead (S1013: D. Herbert *et al.*); NE of Kosi Bay, 49 m, sand, stones, kelp, dead (S5642); SE of Kosi Bay, 48 m, sand and rubble, live (D8714); same loc., 45–47 m, red algae, sponges, live (D6272); same loc., 50 m, medium sand, rubble, live (D8937); off Boteler Point, 50 m, coral rubble, lithothamnion, dead (D7428); same loc., 50 m, coral rubble, lithothamnion, dead (D9163); Sodwana Bay, Sponge Reef, *ca.* 33 m, dead (E804: D. Herbert *et al.*); same loc., Two Mile Reef, 10–15 m, dead (D1845: D. Herbert); NE of Liefeldt's Rocks, 50 m, lithothamnion, medium sand, dead coral rubble, dead (E4314); same loc., 50 m, lithothamnion, stones, some coarse sand, dead (E4389); off Gypsey Hill, 52 m, fine sand, dead (E3403). *Natal*: Durban, probably living (A513: J. Quekett).

Distribution: Tropical Indian Ocean (except Red Sea), as far south as northern Zululand (with one vagrant example from Durban).

Habitat: Living byssally attached to corals or between coral rubble on sandy bottoms at littoral to sublittoral depths.

Remarks: *Bractechlamys nodulifera* was first recorded from South Africa by Smith (1910); the specimen on which this record was based is in the NMSA collection. Individuals from Mozambique and South Africa are typical, although Mozambican material is unusual in colour, being brown with yellow dots. In the literature *B. nodulifera* has sometimes been misidentified as *B. corallinoides* (d'Orbigny *in* Webb & Berthelot, 1839) of the tropical E Atlantic. The latter species differs in being slightly more orbicular, with more numerous commarginal plicae, which are more strongly nodose. Hertlein (1935: 27) and Kay (1979: 525) synonymised the Hawaiian *B. langfordi* (Dall, Bartsch & Rehder, 1938), with the present species. However, *B. langfordi* is smaller in size (up to *ca.* 30 mm high), more strongly convex, and has more numerous and weaker nodules on the radial costae; also, its coloration is brighter orange-yellow. Finally, Rombouts (1991: 47) considered *Pecten arthriticus* Reeve, 1853 to be a junior synonym of *B. nodulifera*, but J. T. Smith (1991: 88) showed this to be a valid species of *Nodipecten* from the tropical E Pacific.



Figs 10–11. *Decatopecten amiculum* (Philippi, 1851): NMSA H4491, Conducia Bay, Mozambique, pv, 45.8 x 44.9 mm. 10. LV exterior. 11. RV exterior.

Genus *Decatopecten* [Rüppell] G. B. Sowerby 2nd, 1839

Decatopecten [Rüppell] Sowerby, 1839: 37, 78, 121. Type species (M): *Pecten plica* Linnaeus, 1758 [*sic*] (= *Ostrea plica* Linnaeus, 1758); Recent, 'O. Indico', restricted to Amboina (Ambon, Maluku, Indonesia) by Iredale (1939).

Decatopecten amiculum (Philippi, 1851)

(Figs 10–11)

Pecten amiculum Philippi, 1851: 89. Type locality: Madagascar (Malagasy Republic).
Decatopecten amiculum; Dijkstra & Knudsen, 1998: 55, pl. 5, fig. 25, pl. 9, figs 42–43 (references and synonymy, type data, distribution).

Description: Shell up to 45 mm high, usually *ca.* 30–35 mm, solid, suborbicular, RV slightly more convex than LV, equilateral, auricles small and subequal, umbonal angle 90–95°. Both valves laterally compressed, sometimes tumid or commarginally inflated by growth interruptions, with several radial plicae (7–11), radially striated, also on interspaces. Microsculpture of closely spaced commarginal lamellae. Hinge small, straight. Byssal fasciole small or absent, byssal notch weak. Active ctenolium with few rudimentary teeth (to 5) on suture, sometimes absent; inactive ctenolium present. Resilifer elongate, triangular. Auricular crura strongly developed; resilial teeth weak or absent. Inner surface slightly plicated. Colour variable, whitish, creamy, yellowish or brownish with lighter or darker blotches or irregular concentric markings, sometimes almost uniform in colour; RV paler.

Type material: see Dijkstra & Knudsen (1998).

Regional data: MOZAMBIQUE: Moçimboa da Praia, living (NMSA G4952: A. Ramalho); Quirimba Island, sandbanks among *Thalassodendron* (NMSA J8618: RK); Nacala, Fernão Veloso, 15 m, sandy bottom with rocks, live (HD6621); NE Nacala Bay, off Chalau, in *Thalassodendron* with gravel, dead (NMSA H4482: K. J. Grosch); Lunga Bay, off Puieirua, 0.3 m below LST, on *Thalassodendron*, gravel (NMSA H4490: K. J. Grosch); same loc., in *Thalassodendron* on gravel, 0.3 m below LST (NMSA H4480: K. J. Grosch); Conducia Bay, dead (NMSA H4491: K. J. Grosch); SW Conducia Bay, 1.2 m below LST, in *Thalassodendron*, muddy, dead (NMSA H4479: K. J. Grosch);

same loc., sandflats, on *Thalassodendron* , dead (NMSA H4475: K. J. Grosch); same loc., 1.2 m below LST, on small rock in *Thalassodendron* , dead (NMSA H4476: K. J. Grosch); Mozambique Bay, S Sancul, 1 m below LST, in *Thalassodendron* with gravel, dead (NMSA H4478: K. J. Grosch); Mozambique Is., *Thalassodendron* and gravel, 0.3 m below LST (NMSA H4480: K. J. Grosch); Inhambane (NMSA G3761: B. J. Young). SOUTH AFRICA: *Zululand* (all NMSA: NMDP): off Kosi Bay, 40 m, shell rubble, dead (D7973); SE of Kosi Bay, 40 m, shell rubble, dead (D8138); same loc., 50 m, fine, slightly muddy sand, dead (D8326).

Distribution: Throughout tropical Indo-Pacific, except Hawaii and Polynesia, southwestern limit northern Zululand.

Habitat: Living free amongst coral rubble or on muddy, sandy or muddy sand bottoms at littoral to sublittoral depths. In Mozambique often living amongst the marine grass *Thalassodendron*.

Remarks: *D. amiculum* differs from the better-known *D. plica* (below) mainly in its more numerous (7–11, against 3–5), equally-strong radial plicae, and usually in its more compressed valves. However, radial striae and commarginal lamellae are similar. The two species appear to be syntopic.

Decatopecten plica (Linnaeus, 1758)

(Figs 12–13)

Ostrea plica Linnaeus, 1758: 696, no. 162; Dijkstra, 1999: 404, figs 2 A-D (lectotype). Type locality: 'O. Indico', restricted to 'Amboina (Ambon, Maluku, Indonesia) by Iredale (1939: 361).

Decatopecten plica; Dijkstra & Knudsen, 1998: 55, pl. 9, figs 40–41 (references, synonymy, type data, distribution, discussion).

Pallium striatum Schumacher, 1817: 120. Type locality: not given, although 'Canton' (Guangzhou, Guangdong, China) on type labels.

Decatopecten striatus; Kira, 1962: 139, pl. 50, fig. 6.

Decatopecten striatum; Bernard, Cai & Morton, 1993: 51.

Pecten velutinus G. B. Sowerby 2nd, 1842: 63, pl. 13, fig. 31; Reeve, 1852: pl. 2, fig. 12; Küster & Kobelt, 1888: 95, pl. 26, figs 2–3; Rombouts, 1991: 37, pl. 13, fig. 11. Type locality: 'Macassar' (Ujung Pandang, Sulawesi, Indonesia).

Pecten subplicatus G. B. Sowerby 2nd, 1842: 64, pl. 13, fig. 37, pl. 14, figs 72–73, 81; Reeve, 1852: pl. 3, figs 17a–b; Dunker, 1882: 242; Küster & Kobelt, 1888: 157, pl. 44, figs 3–5; Rombouts, 1991: 37, pl. 13, fig. 10. Type locality: 'Amboina' (Ambon, Maluku, Indonesia).

Pecten (*Pallium*) *subplicatus*; Dautzenberg & Bavay, 1912: 26 (synonymy).

Pecten strangei Reeve, 1852: pl. 4, fig. 22; *idem*, 1853: pl. 32, fig.148; Küster & Kobelt,1888: 169, pl. 47, fig. 2. Type locality: Moreton Bay, Queensland.

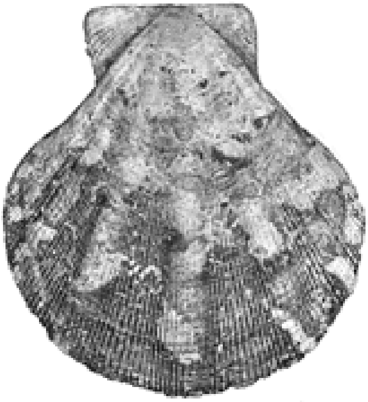
Decatopecten strangei; Iredale, 1939: 361; Lamprell & Whitehead,1992: sp. 68, pl. 12, fig. 68.

Decadopecten (*Decadopecten*) *strangei*; Rombouts, 1991: 37, pl. 13, figs 9–9a.

Comptopallium strangei; Abbott & Dance, 1982: 307, fig.

Pecten (*Nodipecten*) *noduliferus* (in part *non* Sowerby, 1842); Boshoff, 1965: 133, pl. 13, fig. 2.

Description: Shell thick, height to 55 mm, but most adults 30–35 mm, elongate to suborbicular, nearly equivalve, equilateral, auricles small and subequal, umbonal angle *ca.* 85–95°. Both valves strongly convex to more compressed, with prominent radial plicae (3–5, usually 3) and smaller lateral ribs (2–3), both plicae and their intervals radial striated. Microsculpture of close-set commarginal lamellae. Auricles with several radial riblets (8–14) and microscopic commarginal lamellae. Hinge small and straight. Byssal fasciole absent, byssal notch narrow. Active ctenolium with a few small teeth (1–3) on suture, sometimes absent. Resilifer elongate, triangular. Auricular crura strongly developed, resilial teeth weak or absent. Inner surface slightly plicated. Colour variable,



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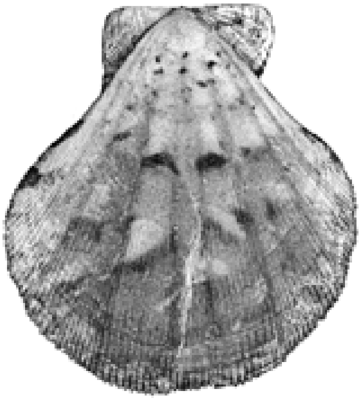

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Figs 12–13. *Decatopecten plica* (Linnaeus, 1758): NMSA G4998, Macoque, Mozambique, pv, H 39.8 x 36.6 mm. 12. LV exterior. 13. RV exterior.

cream, yellow, orange or brown with lighter or darker markings, occasionally uniform in colour; RV paler than LV.

Type material: *O. plica*: syntypes in LSL and UUZM (not registered), lectotype in LSL (designated Dijkstra 1999). *P. striatum*: lectotype ZMUC BIV-59 herein designated; paralectotype ZMUC BIV-60. *P. velutinus*: lectotype BMNH 1996405/1 herein designated; 2 paralectotypes BMNH 1996405/2-3. *P. subplicatus*: type material not present in BMNH (K. Way and J. Pickering pers. comm.). *P. strangei*: lectotype BMNH 1950.11.14.74 herein designated, 2 paralectotypes BMNH 1950.11.14.75–76.

Regional data (all NMSA, selected records only): MOZAMBIQUE: Macoque, beachdrift (G4998: E. Roscoe); Santa Carolina Is., Bazaruto Archipelago, dead on sandbank (K2281: E. Roscoe); Inhaca Is. (4488: P. H. Boshoff). SOUTH AFRICA (all NMDP, unless otherwise stated): *Zululand*: between Bhanga Neck and Kosi Bay, off outer edge of No. 13 reef, *ca.* 34 m, sand, live (D9814: D. Herbert *et al.*); NE of Kosi Bay, 42–44 m, fine sand, dead (S5309); off Kosi Bay, dredged, dead, 40 m, shell rubble, dead (D7973); same loc., 45 m, fine muddy sand, dead (D6039); same loc., 47 m, dead coral, sponges, large algae, living (D6133); SE of Kosi Bay, 40 m, shell rubble (D8138); off Lala Nek, 70 and 72 m, dead (S6625, S7011); SE of Rocktail Bay, 60 m, dead (S5221); off Sodwana, 49–53 m, sand, dead (S4728).

Distribution: Throughout tropical Indo-Pacific, except Hawaii and Polynesia, south-western limit northern Zululand.

Habitat: Living free between coral rubble on muddy or clean sand bottoms at littoral to sublittoral depths.

Remarks: *D. plica* shows extreme polymorphic variability in various characters, namely valve convexity (from inflated to compressed), strength of radial plicae (strong to weakly developed), number of plicae (3–5, with 2 or 3 lateral ribs) and coloration. Specimens from Japan (in literature usually identified as *D. striatus*) and Australia (often identified as *D. strangei*) may be considered as ecomorphs or local forms of *D. plica*. Samples from Mozambique and South Africa resemble the type material of *D. plica*.

Genus *Glorichlamys* Dijkstra, 1991

Glorichlamys Dijkstra, 1991: 45. Type species (OD): *Pecten elegantissimus* Deshayes, 1863; Recent, Rèunion Is.

Glorichlamys elegantissima (Deshayes *in* Maillard, 1863)

Pecten elegantissimus Deshayes *in* Maillard, 1863: 32, pl. 4, figs 11–12. Type locality: Réunion Is., Mascarenes.

Pecten (*Chlamys*) *elegantissimus*; Bavay, 1903: 403, pl. 8, figs 5–7.

Chlamys elegantissima; Lamy, 1935: 310; Rombouts, 1991: 11, pl. 24, fig. 1; Dijkstra *et al.*, 1989: 24; *idem*, 1990: 5, illustr; Anonymous, 1991: 2, fig. 5.

Glorichlamys elegantissima; Dijkstra, 1991: 45, fig. 91 (synonymy, references, discussion); 1998: 20, pl. 2, figs 5–6.

Pecten cooperi E. A. Smith, 1903: 621, pl. 36, figs. 15–18. Type locality: Felidu Atoll, Maldive Islands, 2–64 m.

Description: Shell up to *ca.* 20 mm high, adult height usually 10–15 mm, moderately convex, inequilateral, auricles very unequal, umbonal angle *ca.* 85°–95°, ribbing of valves different. LV with 9–11 prominent radial costae and 1–3 interstitial secondary riblets, one of which is dominant. Ribs with irregular lamellae, sometimes slightly noduliferous. Interspaces covered with concentric lamellae. Anterior auricle much larger than posterior (*ca.* 3:1), sculptured with 4–6 noduliferous and lamellate radial ribs, posterior auricle nearly smooth. RV with 9–11 prominent radial costae, divided into 3–4 lamellate secondary riblets, interspaces smaller than costae and concentrically lamellated. Anterior auricle sculptured with 5–7 noduliferous and/or lamellated radial riblets, less prominent than on LV. Posterior auricle nodulous. Hinge line straight. Byssal fasciole relative broad, byssal notch deep. Active ctenolium with 3–5 teeth on suture. Resilifer black and elongately oblique-triangular. Outer ligament brown. Auricular crura well developed. Inner surface of both valves glossy white and somewhat plicated, more prominent near ventral margin. Colour creamy with pink or brown maculations, LV slightly more strongly coloured.

Type material: *P. elegantissimus*: types not in MNHN. *P. cooperi*: holotype BMNH 1903.9.17.47 (seen by HD).

Regional data: MOZAMBIQUE: Bay of Maputo, Cabo de Santa Maria, beachdrift, dead (NMSA 9159: RK). SOUTH AFRICA: *Zululand* (all NMSA): Kosi Bay, main reef, 1–4 km S of estuary mouth, 18–22 m, dead (S1048: D. Herbert *et al.*); same loc., main reef, 1–4 km S of estuary mouth, 10–16 m, dead (S1836: D. Herbert *et al.*); SE of Kosi Bay, 50 m, coral slabs, dead (S3968: NMDP); same loc., 48 m, sand and rubble, dead (D8427: NMDP); Sodwana Bay, Two Mile Reef, 10–15 m, sorted from stone washings, dead (E788: D. Herbert & R. Broker); off Boteler Point, 70 m, coral rubble, dead (D6415: NMDP); same loc., 70 m, some coarse sand, some shell rubble, dead (D7391: NMDP); same loc., 70 m, sand, some stones, dead (S4162: NMDP); NE of Dog Point, 56–57 m, sand, lithothamnial pebbles, dead (S5038: NMDP); SE of Rocktail Bay, 60 m, coarse sand, dead (S5269: NMDP); NE of Liefeldt's Rocks, 50 m, lithothamnion, medium sand, dead coral rubble, dead (E4317: NMDP); off Cape Vidal, 75–80 m, broken shell, dead (E4527); Ledsman Shoal, 100 m, dead (D663: A. D. Connell); same loc., 8–11 m, dead (D6510: D. Herbert); off Glenton Reef, 50 m, dead (S563: NMDP). *Natal*: off Umlaas Canal, 250 m, coarse sand, dead (D933: NMDP); Aliwal Shoal, 15 m, dead (D5436: G. Smith).

Extralimital material: RÉUNION IS.: Cap la Houssaye, 8–17 m, varied bottom, live (NMSA K4450: D. Herbert).

Distribution: Red Sea to South Africa (as far south as southern Natal) and east to Japan and Polynesia.

Habitat: Attached by byssal threads under stones or coral slabs, or between coral rubble and sediments, on sandy bottoms in 12–110 m.

Remarks: *G. elegantissima* is widely distributed throughout the Indo-Pacific. Although very variable in sculpture, South African specimens are typical.

Genus *Gloripallium* Iredale, 1939

Gloripallium Iredale, 1939: 357. Type species (OD): *Ostrea pallium* Linnaeus, 1758; Recent, Indo-West Pacific.

Gloripallium pallium (Linnaeus, 1758)

Ostrea pallium Linnaeus, 1758: 697, no. 163; Dijkstra, 1999: 405, figs 2 E–F, 3 A–B (lectotype). Type locality: 'O. australiore & Indico' [= Moluccas (Maluku), Indonesia, designated Dijkstra, 1999].
Chlamys (*Aequipecten*) *pallium*; Cox, 1927: 48, 75, pl. 3, fig. 5, pl. 16, fig. 5; *idem*, 1929: 123, 152, pl. 14, fig. 4; Eames & Cox, 1956: 18, 44.
Aequipecten pallium; Lamy, 1935: 314.
Gloripallium pallium; Dijkstra, 1984: 17, fig.; *idem*, 1989: 15, illustr.; *idem*, 1991: 46; *idem*, 1998: 21; Dijkstra *et al.*, 1989: 24; 1990: 3; Rombouts, 1991: 42, pl. 15, figs 4–4a; Dijkstra & Knudsen, 1998: 63, pl. 10, figs 48–49 (further references, synonymy, type data, distribution, discussion).
Cryptopecten pallium; Abbott & Dance, 1982: 309, fig.
Pecten novaeguinae Tenison Woods, 1878: 267. Type locality: Hall Sound, Papua New Guinea (Pleistocene).
Pecten speciosus Reeve, 1853: pl. 27, fig. 112. Type locality: Philippine Islands.
Pecten (*Aequipecten*) *pallium* var. *speciosa* [*sic*]; Dautzenberg & Bavay, 1912: 20.
Chlamys (*Aequipecten*) *pallium* var. *speciosa* [*sic*]; Lamy, 1935: 314.
Gloripallium speciosum; Habe, 1981: 66; Rombouts, 1991: 43, pl. 15, figs 8, 8a–c.
Cryptopecten speciosum [*sic*]; Abbott & Dance, 1982: 309, fig.
Gloripallium pallium forma *speciosum*; Dijkstra, 1988: 19, fig.; *idem*, 1991: 46.

Description: Shell up to 90 mm high, usually *ca.* 60 mm, equivalve, equilateral, orbicular, auricles unequal, umbonal angle *ca.* 90–95°. LV with 12–15 primary radial costae, usually 13, and secondary radial riblets on costae (usually 3, absent near anterior and posterior margins) and in interspaces (2–4). Interspaces equal to/or broader than costae. Concentric lamellae on ribs in early growth stages, more tripartite near ventral margin. Auricles with 3–6 squamous or nodulous radial ribs. RV with similar sculpture as LV. Radial costae somewhat broader than on LV. Interspaces smaller than costae. Hinge line straight. Byssal fasciole rather wide, byssal notch deep. Active ctenolium with 3–6 teeth on suture. Resilifer elongate and triangular. Marginal auricular gape present beneath auricular crura. Inner surface plicated. External colour extremely variable, vividly coloured with blotches and/or bands of red, yellow, purple, maroon or brown; interior whitish, with orange or purple near margins and on auricles.

Type material: *O. pallium*: lectotype designated Dijkstra (1999) in LSL, paralectotypes in LSL and MSNP. *P. novaeguinae*: not traced [Mrs L. Turner, Dr N. Kemp (TMAG) pers. comm.]. *P. speciosus*: holotype BMNH 1950.11.14.67; seen by HD.

Regional data: *G. pallium*: MOZAMBIQUE: Conducia Bay (NMSA H 4468: K. J. Grosch), typical form. SOUTH AFRICA: *Zululand* (all NMSA: NMDP, form *speciosum*): SE of Rocktail Bay, 60 m, coarse sand, dead (S5267); off Lala Nek, 74 m, shells, sand, dead (S7398); same loc., 75 m, coarse sand, sandstone, coral, dead (S5783); same loc., 72 m, slightly muddy sand, pennatulids, dead (S7313).

Distribution: Throughout the tropical Indo-Pacific (except Red Sea and Hawaii), south-western limit northern Zululand.

Habitat: Living byssally attached to rocks or corals, or between coral rubble on sandy bottoms in shallow waters.

Remarks: Waller (1972: 241) considered *Pecten speciosus* Reeve, 1853, to be a junior synonym (an 'intrapopulation variant') of *G. pallium*. However, populations of *P. speciosus* usually live in deeper water - down to sublittoral depths - and thus should rather be regarded as a bathymetric form. *G. pallium* form *speciosum* differs from typical *G. pallium* mainly in possessing more strongly developed concentric lamellae on its radial costae, which are not trifidly divided, and in lacking secondary radial riblets. Intermediate states between the two bathymorphs have been examined (collections MNHN and HD).

Gloripallium spiniferum (G. B. Sowerby 1st, 1835) from French Polynesia is similar to *G. pallium* form *speciosum*, but is smaller (less than *ca.* 30 mm high), less convex, has fewer (8–9) radial costae, and its auricles are more weakly sculptured to nearly smooth. The endemic Red Sea *Gloripallium maculosum* (Forsskål, 1775) (syn. *Ostrea sanguinolenta* Gmelin, 1791) differs from *G. pallium* in its smaller size (up to *ca.* 50 mm) and more elongate form (umbonal angle *ca.* 85–90°); furthermore *maculosum* has more prominent radial costae, which are fewer (7–9) in number and bear more numerous (6–9) secondary radial riblets; concentric lamellae are also more closely spaced than in *G. pallium*.

The present material from Mozambique is similar to the type material of *G. pallium*. South African specimens of *G. pallium* form *speciosum* resemble the type material of the latter, although on the LV the rib intervals are slightly broader and coloration is paler. This is a new record for South Africa.

Genus *Juxtamusium* Iredale, 1939

Juxtamusium Iredale, 1939: 368. Type species (OD): *Juxtamusium oblectatum* Iredale, 1939 [= *Pecten* (*Chlamys*) *coudeini* Bavay, 1903]; Recent, Queensland, 60 m.

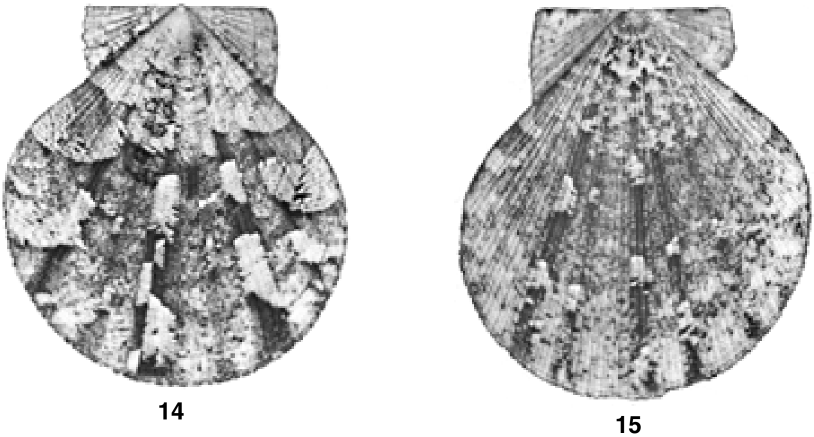
Juxtamusium maldivense (E. A. Smith, 1903)

(Figs 14–15)

Pecten maldivensis E. A. Smith, 1903: 622, pl. 36, figs 19–20. Type locality: Suvadiva Atoll, Maldive Islands, Indian Ocean, 7–80 m.

Juxtamusium maldivense; Dijkstra, 1984: 8, fig.; *idem*, 1991: 47; *idem*, 1998: 23, pl. 3, figs 1–3; Rombouts, 1991: 60, pl. 26, fig. 7; Dijkstra & Knudsen, 1998: 64, pl. 5, fig. 22 (further references, type data, distribution, discussion).

Description: Shell thin, height to 25 mm (average *ca.* 15 mm), compressed, suborbicular, higher than wide, slightly equilateral, auricles unequal, umbonal angle *ca.* 90°. Both valves slightly convex, RV somewhat more so than LV, with numerous fine, irregularly spaced, angular radial riblets, increasing by bifurcation and/or intercalation, and microscopic very closely spaced commarginal lamellae. Posterior auricle larger than anterior, with *ca.* 3–7 radial riblets, sometimes very weak. Hinge straight. Byssal fasciole narrow, byssal notch shallow. Ctenolium present along suture in both valves. Resifer



Figs 14–15. *Juxtamusium maldivense* (Smith, 1903): HD 2734 (ex NMSA D8069), SE of Kosi Bay, Zululand, 65 m, pv, 23.0 x 21.2 mm. 14. LV exterior. 15. RV exterior.

oblong and oblique. Auricular crura weak. Inner surface somewhat plicated near ventral margin. Colour variable, cream to pink, with shades of red or brown and lighter and darker blotches, interior purple or reddish, RV paler; sometimes more uniform in colour.

Type material: see Dijkstra & Knudsen (1998).

Regional data: SOUTH AFRICA: *Zululand* (all NMSA: NMDP, selected records only): off Kosi Bay, 50 m, medium sand, algae, live (D6888); SE of Kosi Bay, 50 m, medium sand and algae, live (D6253); same loc., 65 m, sponge, gorgonians, medium sand, live (D8069); same loc., 48 m, sand and rubble, live (D8716); off Jesser Point, 70 m, medium sand, dead (D8450); off Boteler Point, 50 m, coral, sponges, live (D6839); same loc., 50 m, coral rubble, live (D7741); same loc., 78 m, marine growths, dead (S6649); same loc., 53 m, lithothamnial pebbles, sand, dead (S6875); same loc., 50 m, coral rubble, lithothamnion, live (D7429); same loc., 50 m, coral rubble, lithothamnion, dead (D9204); NE of Dog Point, 56–57 m, sand, lithothamnial pebbles, live (S5050); NE of Liefeldt's Rocks, 50 m, lithothamnion, medium sand, dead coral rubble, dead (E4319); same loc., 50 m, lithothamnion stones, coarse sand, live (E4400).

Distribution: Throughout tropical Indo-West Pacific (except Hawaii and Polynesia), south-western limit northern Zululand.

Habitat: Living byssally attached to coral branches, under rocks or between coral rubble on sandy bottoms at littoral to sublittoral depths.

Remarks: *Juxtamusium coudeini* (Bavay, 1903), its only congener, is morphologically very similar but attains a somewhat larger size (to *ca.* 30 mm high), with fewer, more regularly spaced, rounded radial riblets. For more information on functional morphology and ecology see Waller (1972: 253). Present specimens from South Africa are similar to the type material, although the angular radial riblets are slightly more prominent.

Genus *Mirapecten* Dall, Bartsch & Rehder, 1938

Mirapecten Dall, Bartsch & Rehder, 1938: 84. Type species (OD): *Mirapecten thaanumi* Dall, Bartsch & Rehder, 1938 (= *Pecten mirificus* Reeve, 1853); Recent, Hawaii.

Somalipecten Waller, 1986: 41. Type species (OD): *Somalipecten cranmerorum* Waller, 1986; Recent, off Somalia. **Syn. n.**

Remarks: Hertlein (1969: N366) treated *Mirapecten* as a subgenus of *Semipallium* [Jousseaume] Lamy, 1928, which he referred to the same suprageneric group as *Decatopecten*. Waller (1986: 40), followed by Vaught (1989: 119), considered *Mirapecten* as a full genus in the tribe Decatopectinini. *Somalipecten* was originally differentiated from *Mirapecten* by the presence in the latter taxon of a deep byssal notch throughout ontogeny and of well-developed scales on its radial plicae (or at least on the posterior plica of both valves). However even within different species of *Mirapecten* these characters vary, so that the byssal notch may be deep or only moderately deep, and scales range from well developed to absent.

Representative Recent species of *Mirapecten* are: *M. rastellum* (Lamarck, 1819) and *M. mirificus* (Reeve, 1853) from the tropical W and SW Pacific, *M. spiceri* (Rehder, 1944) from the central Pacific, *M. cranmerorum* (Waller, 1986) from off Somalia, *M. moluccensis* Dijkstra, 1988, from the tropical W. Pacific, *M. tuberosus* sp. n. (described herein) from the tropical and subtropical western Indian Ocean, and *M. yaroni* Dijkstra & Knudsen, 1998, from the Red Sea region.

Mirapecten tuberosus sp. n.

(Figs 16–19)

Mirapecten rastellum (*non Pecten rastellum* Lamarck, 1819); Oliver, 1992: 71, 77, textfig. 15, pl. 12, figs 6a–b.

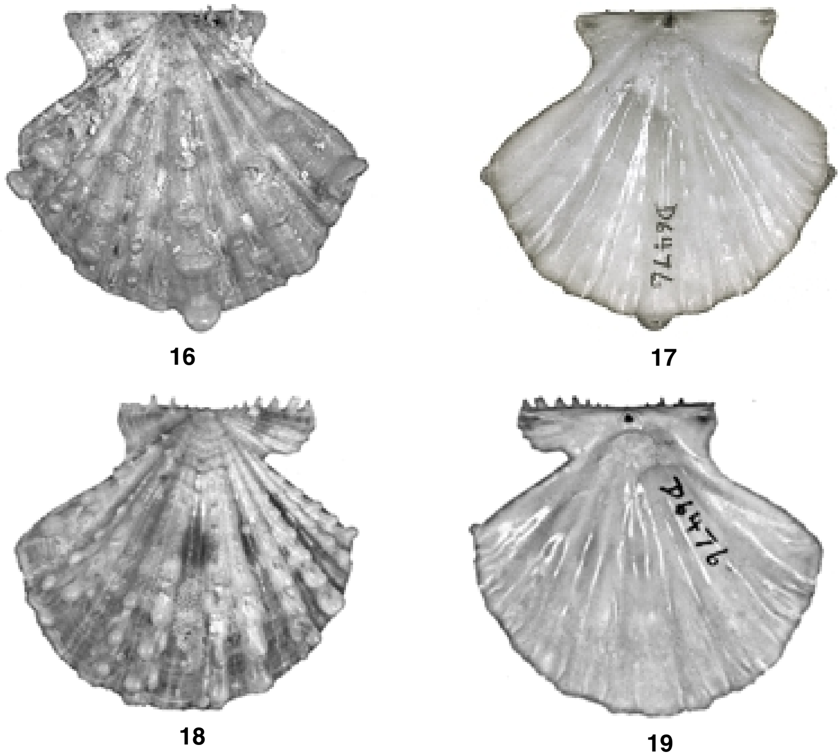
Description: Shell height to *ca.* 40 mm, wider than high, triangularly orbicular, inequivalve, inequilateral, RV more convex than LV, auricles unequal, umbonal angle *ca.* 90–95°, preradial stage (*ca.* 4 mm high) smooth, microsculpture of very fine, closely spaced commarginal lamellae. LV slightly convex, with 5 primary radial plicae, covered with 3–7 tubercular spines (in early radial stage) or vesicles (in late radial stage), and 4 secondary intercostal lirae with 1–3 small tubercles. Auricles with 2 weak radial scaly riblets, on posterior more prominent. RV with 5 bipartite radial plicae and one lira near posterior margin, covered with 4–7 small vesicles, interstices smooth and rather broad. Anterior auricle with 4–6 radial riblets, absent on posterior auricle. Tubercular spines present on dorsal margin, more prominent on anterior auricle. Byssal notch deep, byssal fasciole moderately broad; active ctenolium with 6 teeth on suture. Hinge line straight. Resilifer triangular. Resilial teeth absent, dorsal teeth prominent. Auricular crura well developed. Inner surface of both valves plicate and slightly carinate near periphery. Colour uniform red, reddish-orange, orange or yellow, RV paler; interior glossy white or pigmented beyond pallial line by external coloration.

Dimensions: height 32.2 mm, length 36.9 mm, depth 11.5 mm (holotype); largest paratype 35.5 x 41.6 mm.

Type locality: off Dog Point, northern Zululand, South Africa, 27°06.5'S, 32°52.9'E, 70 m, sandstone conglomerate, live, NMDP, 4.vi.1987.

Type material: Holotype NMSA D6476/T1725, data as above.

Paratypes (all NMSA: NMDP, unless otherwise stated): *Zululand*: NE of Kosi Bay, 26°52.4'S, 32°55.2'E, 45–47 m, sand, Stn ZA38, 3.vi.1990 (S6898/T1700: 1 LV); NE of Kosi Bay, 26°52.9'S, 32°55.3'E, 49 m, sand, stones, kelp, Stn ZA41, 3.vi.1990 (S5674/



Figs 16–19. *Mirapecten tuberosus* sp. n. Holotype, NMSA D6476, off Dog Point, Zululand, 70 m, pv, 32.2 x 36.9 mm. 16. LV exterior. 17. LV interior. 18. RV exterior. 19. RV interior.

T1707: 1 RV); off Kosi Bay, 26°53.8'S, 32°55.5'E, 50 m, 8.vi.1987 (D8383/T1682: PV); SE of Kosi Bay, 26°54.3'S, 32°55.5'E, 45 m, sand, stones, large algae, Stn ZA49, 4.vi.1990 (S4865/T1714: 1 LV); off Kosi Bay, 26°54.6'S, 32°55.3'E, 50 m, medium sand, algae, Stn ZA9, 7.vi.1987 (E519/T1715: 1 PV); off Boteler Point, 27°00.3'S, 32°55.3'E, 68 m, Stn ZB17, 3.vi.1996 (S9703/T1713: 1 LV); off Boteler Point, 27°01.2'S, 32°54.2'E, 50 m, dead coral rubble, 6.vi.1987 [MNHN (ex D7732): 1 LV, 1 RV; D7732/T1702: 1 PV, 1 RV]; off Boteler Point, 27°02.6'S, 32°53.8'E, 50 m, Stn ZB16, 6.vi.1990 (S7450/T1703: 1 LV); off Boteler Point, 27°03.7'S, 32°53.8'E, 55 m, sponges, stones, sand, Stn ZB25, 6.vi.1990 (S6409/T1704: 1 RV); off Boteler Point, 27°04.2'S, 32°53.9'E, 58–61 m, sand, pebbles, Stn ZB28, 6.vi.1990 (S4171/T1705: 1 LV); off Dog Point, 27°06.0'S, 32°53.3'E, 74 m, sandstone rubble, gorgonians, Stn ZC10, 7.vi.1990 [ZMA Moll. 3.99.002 (ex S6460): 1 PV]; off Dog Point, 27°07.6'S, 32°52.4'E, 76 m, sandstone rubble, gorgonians, Stn ZC12, 7.vi.1990 (S8994/T1716:1 RV); SE of Rocktail Bay, 27°11.5'S, 32°50.4'E, 78 m, sandstone rocks, Stn ZD10, 8.vi.1990 (S4634/T1681:1 RV); NE of Liefeldt's Rocks, 27°43.4'S, 32°39.8'E, 50 m, medium sand with some stones, Stn ZJ5, 9.vi.1988 (E3440/T1680: 1 RV); off Ledsman Shoal, 100 m, leg. A. D. Connell, 22.iv.1980 (B2665/T1701: 1 LV).

Material examined (other than the types): SEYCHELLES: 58 m, dead coral rubble, sand, live (HD 2676); same loc., 46 m, dead coral rubble, sand, live (HD 2685). MAURITIUS: off west coast, 40–48 m, amongst coral rubble, sand, live (HD 2675);

off west coast, 34 m, amongst coral rubble, sand, live (HD 6589). REUNION: off St. Gilles, 45–50 m, amongst coral rubble, sand, live (HD 2680).

Distribution: Tropical and subtropical western Indian Ocean, from the Red Sea and Mascarenes to northern Zululand.

Habitat: Sublittorally amongst coral or sandstone rubble on sandy bottoms; present material collected living in 34–70 m. No records are yet available from Mozambique.

Discussion: *Mirapecten tuberosus* most closely resembles *M. mirificus* (Reeve, 1853), but differs from the latter species in its more orbicular shape, *M. mirificus* being more obliquely orbicular. Also, the LV in *M. tuberosus* is slightly convex, in *M. mirificus* it is flat; the posterior auricles in *M. tuberosus* are usually smaller than in *M. mirificus; M. tuberosus* has a more prominent sculpture of scales and vesicles, and the shell is thicker; *M. mirificus* has a weaker sculpture of smaller erect scales, which are sometimes even absent.

Mirapecten rastellum (Lamarck, 1819) differs from *M. tuberosus* in its more regularly spaced radial plicae; *M. tuberosus* has more numerous, irregularly spaced primary and secondary radial plicae and lirae. Also, *M. rastellum* lacks vesicles on the plicae as found in *M. tuberosus.*

Mirapecten moluccensis Dijkstra, 1988, differs from *M. tuberosus* in its more regularly spaced, radial plicae, which are slightly undulated or bear small tubercles. *M. moluccensis* has antimarginal striae near the ventral margin, which are absent in *M. tuberosus.* The colour pattern of *M. moluccensis* mainly differs from that of *M. tuberosus* in the presence of milky white, black or brown dots on the radial plicae; *M. tuberosus* is more uniform in colour.

Mirapecten yaroni Dijkstra & Knudsen, 1998, of the Red Sea is morphologically closest to *M. rastellum* and differs further from *M. tuberosus* in its larger size (attaining 70 mm, compared with only about 35 mm in *M. tuberosus*), and in its regularly spaced radial plicae which on the LV bear strongly produced lamellar scales.

M. cranmerorum (Waller, 1986) similarly differs from *M. tuberosus* in its larger size (attaining 70 mm high), its strongly developed and broader radial plicae, without secondary intercostal radial lirae such as occur in *M. tuberosus*, and in commonly possessing fine antimarginal striae near the ventral margin, which are lacking in *M. tuberosus. M. cranmerorum* may have a few, very weak scales on the radial plicae, but these are usually absent; *M. tuberosus* has strongly produced scales and vesicles on the radial plicae and intermediate lirae.

Remarks: Although Oliver (1992) figured this species as *Mirapecten rastellum*, it resembles neither the type specimen of *Pecten rastellum* Lamarck, 1819, nor the accompanying specimen of *P. rastellum* 'var. b' of Lamarck, 1819 (see Dijkstra 1994: 474, pl. 6, figs 17–21, pl. 7, figs 22–26), as suggested by him.

Etymology: *tuberosus* = tuberculate, Latin, adj.

Tribe Pectinini Wilkes, 1810

Genus *Pecten* Müller, 1776

Pecten Müller, 1776: 248. Type species (SD Schmidt 1818): *Ostrea maxima* Linnaeus, 1758; Recent, eastern Atlantic.

Pecten afribenedictus Kilburn & Dijkstra, 1995

Pecten afribenedictus Kilburn & Dijkstra, 1995: 272, figs 1–9; Steyn & Lussi, 1998: 212, fig. 862. Type locality: off Umkomaas, S Natal, South Africa, 30°12'S, 30°48'E, 55 m.

Type material: Holotype NMSA A1314/T928, 12 paratypes (11 NMSA, 1 ZMA) (see Kilburn & Dijkstra 1995: 276).

Distribution: Continental shelf of SE Africa, from northern Zululand (Kosi Bay) to eastern Cape (East London area).

Habitat: Littoral to sublittoral depths, free-living on fine to medium sandy sediments.

Pecten sulcicostatus G. B. Sowerby 2nd, 1842

(Figs 20–22)

Pecten sulcicostatus Sowerby, 1842: 47, pl. 13, figs 35–36; Sowerby, 1892: 89, pl. 5, figs 97–98; Dunker, 1858: 67, pl. 23, figs 4–6; Küster & Kobelt, 1888: 144, pl. 40, figs 6–7; Bartsch, 1915: 186; Turton, 1932: 222; van Bruggen, 1961: 31, pl. 1, fig. 4; Barnard, 1964: 421; *idem*, 1974: 761; De Villiers, 1976: 1, textfigs 1–10, tables i–vii; Rombouts, 1991: 53, pl. 19, fig. 8; Kilburn & Dijkstra, 1995: 271; Lussi, 1995: 1, 2, fig. 1; Steyn & Lussi, 1998: 212, fig. 863. Type locality: unknown; here designated as False Bay, South Africa, 40 m.

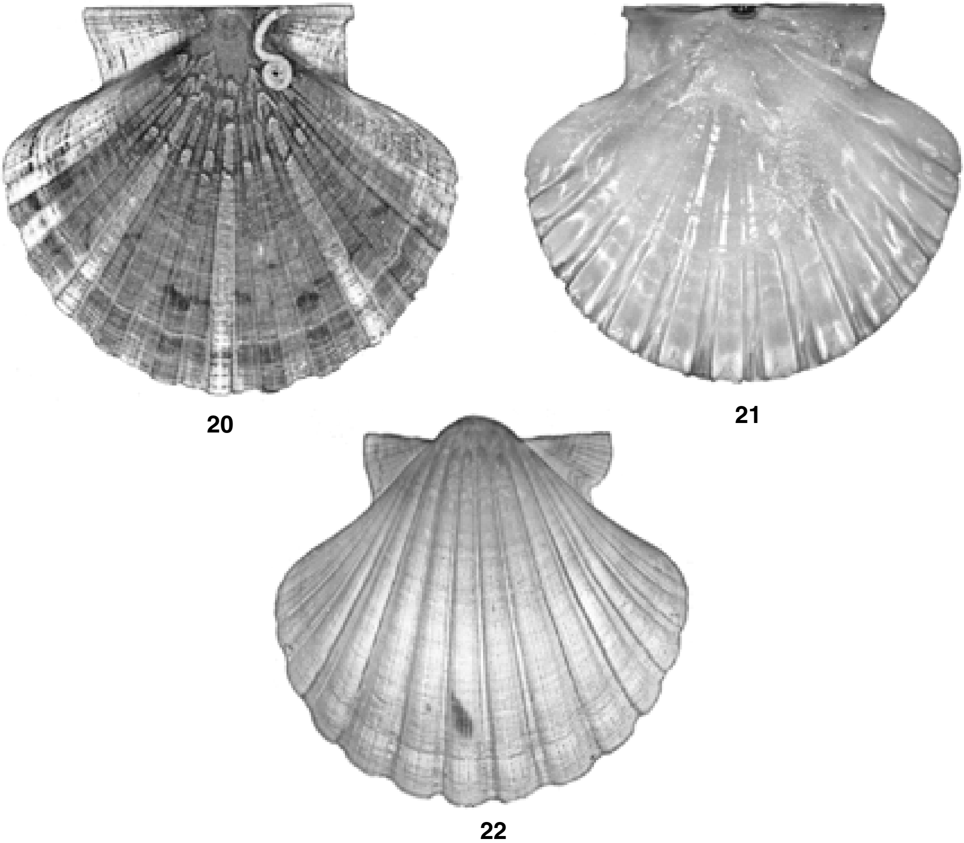
Pecten maximus sulcicostatus; Fleming, 1957: 10; Kilburn & Rippey, 1982: 171, pl. 38, fig. 13.

Pecten (*Vola*) *capensis* [Gray] G. B. Sowerby 3rd, 1892: 66 (*nomen nudum*).

Description: Shell height to *ca.* 100 mm (most adults 60–80 mm), solid, suborbicular, strongly inequivalve, LV flat, RV convex, equilateral, auricles equal, umbonal angle *ca.* 90–100°. Both valves sculptured with 12–15 radial costae, on LV high and rounded with secondary radial riblets, interstices wider than primary ribs with closely spaced commarginal lamellae, on RV primary ribs subangular also with secondary radial riblets, interstices narrower than primary ribs, with secondary radial riblets and microscopic interstitial commarginal lamellae. Auricles with 4–9 weak radial riblets and fine, closely arranged commarginal lamellae. Hinge line straight. Auricular and disc gape narrow. Byssal fasciole small, byssal notch shallow, no ctenolium. Inner surface with angular ribs near ventral margin and auricular denticles near anterior and posterior margins. Cardinal crura with intermediate teeth. Resilifer elongate-triangular. Colour off-white with pink, salmon or brown markings, RV paler than LV.

Type material: Sowerby (1842: 47) mentioned that the described specimen was in 'Mr. Norris's Collection' (= Thomas Norris of Preston), which was auctioned in 1873 by J. C. Stevens (Dance 1986: 166, 169, 232). The holotype is now untraceable.

Regional data (all NMSA): SOUTH AFRICA: *False Bay*: off Buffels Bay, 47 m, slightly muddy sand, live (S8434); off Miller's Point, 34 m, sand, dead (S7724); between Seal Is. and Simonstown, 30 m, fine sand, dead (S8080); off Partridge Point, 45 m, muddy sand, live (S3730); N of Simonstown, 28 m, sand, shell, dead (S3533); False Bay, 42 m, live (A1919); 2 km NE of Miller's Point, 34 m, sand, live (S9266). *Agulhas Bank*: SW of Stilbaai, 60 m, dead (B2465); SE of Mossel Bay, 73 m, live (E5254); off Mossel Bay, 73 m, live (A920); off Bird Is., Algoa Bay, 73–110 m, live (4498); St. Francis Bay, 70 m, fine muddy sand, worm tubes and pennatulids, live (B1622); off East London, 70 m, fine sand, broken shell, dead (B8413); same loc., 70 m, muddy sand, dead (B8332). *W Cape Littoral*: Struis Bay, Cape Agulhas, beachdrift (E6458); Die Mond, Cape Agulhas, beachdrift (E6615). *E Cape Littoral*: Jeffreys Bay, beachdrift (B646); Port



Figs 20–22. *Pecten sulcicostatus* Sowerby,1842: HD 3669, False Bay, *ca*. 40 m, pv, 72.9 x 80.9 mm. 20. LV exterior. 21. LV interior. 22. RV exterior.

Elizabeth, beachdrift (2431); Port Elizabeth, beachdrift (4495); Philip's Reef, Port Elizabeth, 11 m, dead (E7232–3).

Distribution: Endemic to inner continental shelf of South Africa, relatively limited distribution from False Bay to East London.

Habitat: Mainly sublittoral depths, in 30–70 m, free-living on sandy or muddy sand. Shallower water individuals are smaller and often more brightly patterned than those from the continental shelf.

Remarks: Sowerby (1892) used the manuscript name *Pecten* (*Vola*) *capensis* Gray MS, for this species, without any description, but on p. 89 corrected the name to *P. sulcicostatus*. Fleming (1957), followed by Kilburn & Rippey (1982), treated *P. sulcicostatus* as a subspecies of *Pecten maximus* (Linnaeus, 1758) from the eastern Atlantic. The present species 'probable arose from a Pliocene or Pleistocene relation of *maximus* which it closely resembles' (Fleming, 1957: 23). Waller (1991: 18, 37) also considered *P. sulcicostatus* to be morphologically close to *P. maximus*, but treated it as a full species. No intermediate populations are known from western Africa.

De Villiers (1976) conducted exploratory surveys in False Bay and off Mossel Bay, with a view to establishing whether a local scallop-fishing industry would be viable. Population density off Mossel Bay was inadequate, but False Bay proved promising, although it was concluded that the exploitable area was too small.

Subfamily Chlamydinae von Teppner, 1922

Tribe Chlamydini von Teppner, 1922

Genus *Laevichlamys* Waller, 1993

Laevichlamys Waller, 1993: 204. Type species (OD): *Pecten multisquamatus* Dunker, 1864; Recent, tropical western Atlantic.

Laevichlamys deliciosa (Iredale, 1939)

(Figs 23–24)

Mimachlamys deliciosa Iredale, 1939: 350, pl. 5, figs 22–22a. Type locality: Low Isles, SE of Lizard Island, N Queensland.

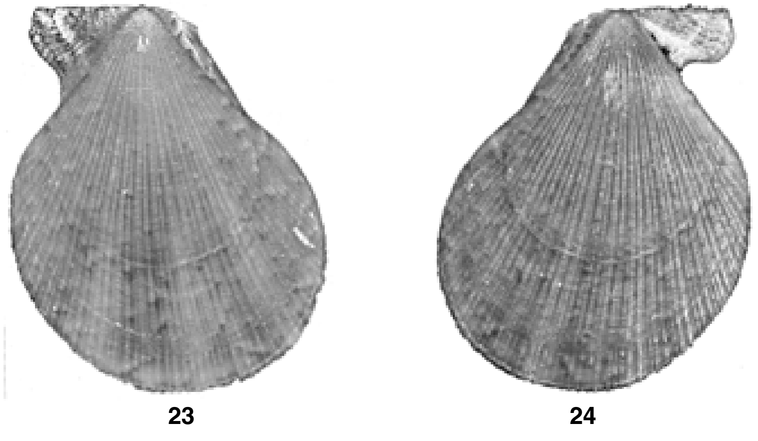
Chlamys deliciosa; Dijkstra, 1991: 30 (synonymy, references).

Laevichlamys deliciosa; Dijkstra & Kastoro, 1997: 268, fig. 134 (type data, description, distribution).

Chlamys (*Chlamys*) *princessae* Kuroda & Habe *in* Kuroda, Habe & Oyama, 1971: 364, pl. 79, figs 16–17. Type locality: Sagami Bay, Japan.

Chlamys (*Chlamys*) *princessae*; Rombouts, 1991: 17, pl. 24, fig. 6.

Description: Shell height to 25 mm (averaging *ca.* 15 mm), elongate, sometimes obliquely oblong, RV slightly more convex than LV, somewhat equilateral, auricles very unequal, umbonal angle *ca.* 80–85°. Both valves with numerous fine, irregularly spaced, spiny radial riblets, increasing to *ca.* 45–50 by intercalating riblets towards ventral margin. Intervals microscopically granulated or reticulated in early ontogeny, smooth in late radial stage (i.e. near ventral margin). Anterior auricles with 9–14 fine radial riblets; posterior ones with weaker riblets (6–10). Postero-dorsal margin of hinge line somewhat declivous. Byssal notch small. Active ctenolium with 4–6 teeth. Colour uniformly cream, orange, pink or purple, sometimes also patterned with darker rays or blotches.



Figs 23–24. *Laevichlamys deliciosa* (Iredale, 1939): NMSA S4892, off Boteler Point, Zululand, 70 m, pv, 24.1 x 19.5 mm. 23. LV exterior. 24. RV exterior.

Type material: *M. deliciosa*: holotype AMS C 89669. *C.* (*C.*) *princessae*: holotype NSMT-MoR 9610; paratype NSMT-MoR 9611. Seen by HD.

Regional data: MOZAMBIQUE: off Lacerda Lighthouse, 40 km N. of Mapoto, 80 m, among corals (NMSA L4652: J. Rosado). SOUTH AFRICA [all NMSA: NMDP (unless otherwise stated), selected records only]: *Zululand*: off Kosi Bay, 75 m, coral rubble, sandstone, marine growths, live (D9012); SE of Kosi Bay, 65 m, sponge, gorgonians, medium sand, live (D8068); off Boteler Point, 66 m, sand, rocks, live (S3833); same loc., 71 m, sand, live (S8813); same loc., 70 m, rocks, sand, live (S4892); same loc., 70 m, some coarse sand, some shell rubble, dead (D7365); off Dog Point, 76 m, sandstone rubble, gorgonians, live (S8976); NE of Lala Nek, 66–71 m, coarse sand, sandstone rocks, live (S6110); off Lala Nek, 75 m, coarse sand, sandstone, coral, live (S5838); same loc., 72 m, slightly muddy sand, pennatulids, live (S7322); off Island Rock, 62 m, sandstone, coral, marine growth, live (D6353); off Sodwana Bay, 70 m, coral rubble, live (S3898); off Jesser Point, 68 m, sponge, coral rubble, live (D6508); Ledsman Shoal, 100 m, live (B4057: A. D. Connell). *Natal*: off Durban Bluff, 80–90 m, grey sandy mud, dead (D3774); Aliwal Shoal, 10–25 m, live (B3065: A. D. Connell).

Distribution: Subtropical-tropical Indo-West Pacific, from southern Japan to northern Australia and New Caledonia, also western Indian Ocean as far south as southern KwaZulu-Natal.

Habitat: Living littorally to sublittorally amongst coral rubble on sandy or muddy sand bottoms. Shell surface often encrusted with sponges.

Remarks: The present specimens from Zululand resemble the type material of *Mimachlamys deliciosa*, and represent a new record for the region.

Laevichlamys lemniscata (Reeve, 1853)

(Figs 25–26)

Pecten lentiginosus Reeve, 1853: pl. 35, fig. 170 (renamed *Pecten lemniscatus* Reeve, 1853: in errata) Type locality: unknown, here designated as Rèunion Is., Mascarenes.

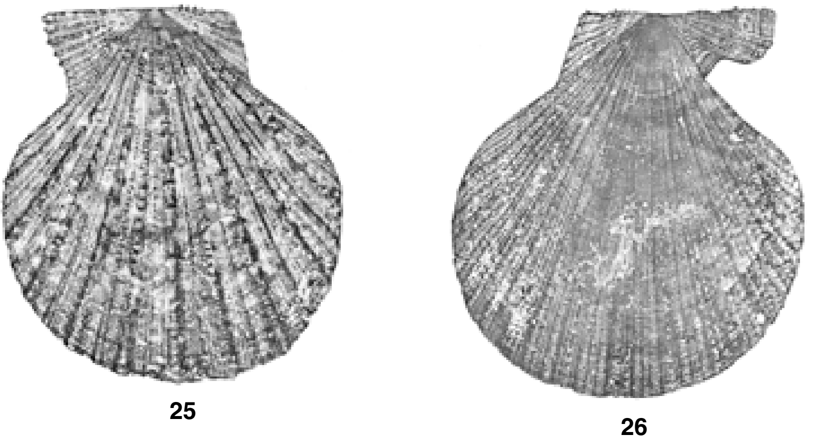
Laevichlamys lemniscata; Waller, 1993: 204.

Pecten squamosus (*non* Gmelin, 1791); Sowerby, 1897: 28; Barnard, 1964: 420; *idem*, 1974: 761

Chlamys (*Chlamys*) *liltvedi* Wagner, 1984: 3, figs 1–4. Type locality: Sodwana Bay, Zululand, 18 m, under rocks on reef. **Syn. n.**

Chlamys liltvedi; Steyn & Lussi, 1998: 212, fig. 860.

Description: Shell height to 50 mm (average *ca.* 35 mm), suborbicular to somewhat obliquely oblong, compressed, equiconvex or RV slightly more convex than LV, somewhat inequilateral, auricles unequal, umbonal angle *ca.* 90°. Both valves sculptured with numerous, irregularly spaced, squamous radial ribs, several prominent on LV (6–9) with strongly developed scales. Antimarginal striated microsculpture in early ontogeny, sometimes throughout ontogeny near postero-lateral area on LV, commarginal lamellated microsculpture on anterior auricle of LV, sometimes throughout ontogeny near antero-lateral area of LV, shagreen (reticulated or granulated) microsculpture absent. Hinge line straight, postero-dorsal auricle slightly curved. Inner surface weakly plicated, most strongly around periphery. Byssal fasciole wide, byssal notch deep. Active ctenolium well developed with 6–9 teeth on suture. Cardinal crura weak. Resilifer oblong, oblique. Colour variable, creamy, yellowish, orange, reddish or brownish with lighter and darker dots, sometimes uniformly coloured.



Figs. 25–26. *Laevichlamys lemniscata* (Reeve, 1853): NMSA S8958, off Kosi Bay, Zululand, 51 m, pv, 48.6 x 44.1 mm. 25. LV exterior. 26. RV exterior.

Type material: *P. lemniscatus*: holotype BMNH 1996404. *C.* (*C.*) *liltvedi*: holotype SAM 35885, 4 paratypes SAM 35886 (1 PV), 1 paratype NMSA D1615/T3144 (1 PV), others in H. P. Wagner colln, no. 1000 (1 PV), W. R. Liltved colln (1 PV) and C. M. Connolly colln (1 LV).

Regional data (selected records only): MOZAMBIQUE: SW Conducia Bay, NW Choca, washed ashore during cyclone (NMSA H4209: K. J. Grosch); same loc., 0.6 m, *Thalassodendron* and gravel, dead (NMSA H4208: K. J. Grosch); same loc., LST, *Thalassodendron*, gravel (NMSA H210: K. J. Grosch); Bazaruto Island (NMSA F5305: J. Dichmont); Bazaruto Island (NMSA J5092); off Inhambane, byssally attached to coral, live (HD6719); Inhaca Is. (NMSA 4476, 9888: P. Boshoff); off Malongane, 5–10 m N of Ponta do Ouro, coral reef, 15–20 m, dead (NMSA L1321: D. Herbert). SOUTH AFRICA (all NMSA): *Zululand*: between Bhanga Neck and Kosi Bay, reef off marker 13 N, 9–14 m, dead (S1598: D. Herbert *et al.*); same loc., No. 13 reef, 6–18 m, live (D9592: D. Herbert *et al.*); off Kosi Bay, 51 m, sand, stones, large algae, dead (S8958: NMDP); same data, 45 m, sand, stones, dead (S4864); Kosi Bay, main reef, 1–4 km S of estuary mouth, 16–20 m, dead (S1390: D. Herbert *et al.*); same loc., 18–22 m, 21–24, 21–24 m and 10–16 m, dead (S1006, S1834, S1942: D. Herbert *et al.*); same loc., 17–18 m, live (S1110: D. Herbert *et al.*); SE of Kosi Bay, 50 m, algae, shells, live (D6097: NMDP); off Boteler Point, 50 m, dead coral rubble, live (D7341: NMDP); same data, coral and sponge. living (D6843: NMDP); NE of Dog Point, 56–57 m, sand, lithothamnial pebbles, dead (S5039: NMDP). Sodwana Bay, Two-Mile Reef, 10–15 m, sorted from stone washings, live (E755: D. Herbert & R. Broker); same loc., inner edge, 14–15 m, live (D4990: D. Herbert); same loc., outer edge, 14–17 m, dead (D5094: D. Herbert); Sodwana Bay, Seven-Mile Reef, 20–23 m, dead (S3349: D. Herbert); Ledsman Shoal, reef off wreck of Tamavo, 20–28 m, dead (E2418: D. Herbert & KZNW); same loc., outer portion, 24–26 m, sorted from stone washings, live (E2600: D. Herbert & KZNW); same loc., Raggie Reef, 1–2 km N of Leven Point, 8–12 m, a mixed algal and coral reef, dead (E2468: D. Herbert & KZNW). *Natal*: Durban (2416: H. C. Burnup); Durban (4474, 2415: H.. C. Burnup); Aliwal Shoal, on inside of reef, just S of the Pinnacles, among boulders, 10 m, dead (B2896: D. Smith); Aliwal Shoal, off Scottburgh, 10–20 m, dead (S8036: D. Herbert).

Distribution: Western Indian Ocean, from Malagasy Republic and the Mascarenes to eastern South Africa, as far south as southern Natal.

Habitat: Living byssally attached to rocks or corals and between coral rubble or sediments on sandy or muddy sand bottoms at littoral to sublittoral depths.

Remarks: *C. liltvedi* is here synonymised with *Pecten lemniscatus*, as it agrees in all aspects with the holotype of that. The most similar species is *Laevichlamys rubromaculata* (G. B. Sowerby 2nd, 1842) from the NW Indian Ocean and Red Sea. This differs from *L. lemniscata* mainly in its more delicate and weaker sculpture and microsculpture, and in its coloration of red, orange or brown maculations between primary radial ribs on a creamy or yellow background (it is rarely uniformly coloured).

In the literature the name '*P. lemniscatus*' has been frequently misapplied; thus, records under this name by Dautzenberg & Bavay (1912: 13), Kira (1962: 137), Habe (1981: 63), Abbott & Dance (1982: 312), Rombouts (1991: 15) and Bernard *et al.* (1993: 48) were based on various *Scaeochlamys* species. Smith's (1885: 298) record of '*Pecten lemniscatus*' from the Philippines is also doubtful, as material from that region has a shagreened microsculpture, which is absent in the holotype of *P. lemniscatus*, and is in fact lacking in this species throughout its ontogeny.

Laevichlamys weberi (Bavay, 1904)

(Figs 27–28)

Chlamys weberi Bavay, 1904: 202, pl. 6, figs 5–6; Lussi, 1995: 2, fig. 23; Steyn & Lussi, 1998: 212, fig. 859. Type locality: 'Cost. Africae occidentalis' (herein restricted to Durban, KwaZulu-Natal, South Africa).

Chlamys (*Chlamys*) *weberi*; Wagner, 1983: 145–148, figs 9–11.

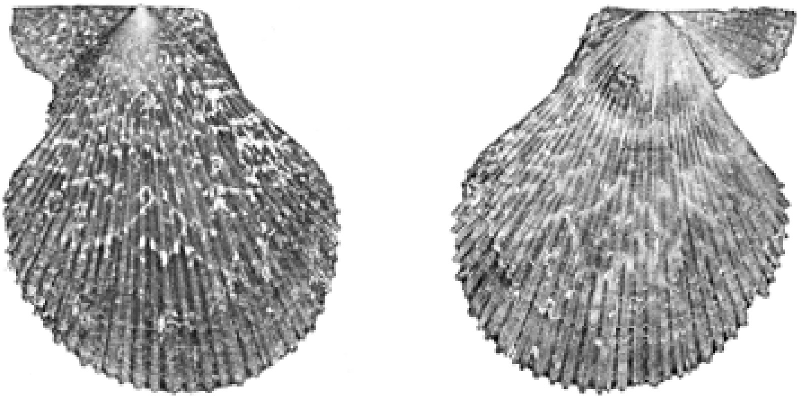
Chlamys natalensis E. A. Smith, 1906: 60, pl. 8, figs 7–7a, 8–8a; *idem*, 1910: 213; Barnard, 1964: 426, fig. 14d; *idem*, 1974: 761 (posthumous); Boshoff, 1965: 135, pl. 14, fig. 6; Kilburn & Rippey, 1982: 171. Type locality: Durban.

Pecten natalensis; Bartsch, 1915: 186; Turton, 1932: 222.

Chlamys (*Chlamys*) *natalensis*; Wagner, 1983: 145–146, 148, fig. 1 (holotype refigured).

Description: Shell height to *ca.* 30 mm (average 15–20 mm), rather compressed, RV slightly more convex than left, elongate, equilateral to somewhat inequilateral, auricles unequal, umbonal angle *ca.* 85–90°. Both valves sculptured with numerous, regularly closely spaced, rounded scabrous radial costae (*ca.* 35–45), strongly lamellose near ventral margin, interior regularly plicated. Microsculpture of antimarginal striae in preradial stage, followed by an abrupt change to shagreened or reticulate microsculpture in submarginal region, usually transforming again into antimarginal microsculpture near ventral margin, sometimes lacking. Intercostal commarginal lamellated microsculpture absent. Anterior auricles much larger than posterior ones, with *ca.* 10 squamose radial riblets and interstitial shagreened microsculpture (absent in RV), on posterior auricles weakly developed (*ca.* 5). Hinge line straight, near postero-dorsal margin somewhat sloping. Byssal fasciole rather broad, byssal notch deep, active ctenolium with 5–7 teeth on suture. Auricular crura well developed. Resilium triangularly elongate. Colour variable, greyish, creamy, pinkish, purplish-brown, faintly mottled, sometimes uniform yellow or orange.

Type material: *C. weberi*: holotype KBIN coll. Dautzenberg, I.G. no. 10.591, paratype ZMA Moll. 304.002. *C. natalensis*: holotype BMNH 1906.6.23.32. Seen by HD.



Figs 27–28. *Laevichlamys weberi* (Bavay, 1904): NMSA 2423, Durban, Natal, pv, 24.1 x 21.0 mm. 27. LV exterior. 28. RV exterior.

Regional data (all NMSA, unless otherwise stated): MOZAMBIQUE: Baia dos Cocos, dead (F9683: A. Jenner); Bay of Maputo, Inhaca Island, dead (4486: P. H. Boshoff); Bay of Maputo, Cabo de Santa Maria, dead (9160: RK). SOUTH AFRICA: *Zululand*: off Hully Point, 50 m, fine sand, dead (D7561: NMDP); SE of Port Durnford, 165 m, mud with sand, dead (E8721: NMDP); Sodwana Bay, Two Mile Reef, 10–15 m, stone washings, live (E787: D. Herbert & R. Broker). *Natal*: off Durban Bluff, 20–22 m, sand, dead (B5458: R. N. Kilburn & R. Fregona); same loc., 18–20 m, dead (B8984: R. N. Kilburn & D. Herbert); Durban, dead (2422, 2424, 2421: H. C. Burnup); same loc., dead (2423: H. C. Burnup); Durban, South Beach (B4893: R. N. Kilburn & R. Fregona); off Umlaas Canal, 200 m, coarse sand, dead (D881: NMDP); same loc., 50 m, fine sand, dead (D998: NMDP); off Amanzimtoti, 260–270 m, medium sand, dead (D1195: NMDP); Kelso, dead (A2221: RK); Port Shepstone, dead (D4485: H. C. Burnup); Melville, dead (5008: RK). *Transkei*: Mzamba, beachdrift (D2761: R. N. Kilburn & D. Herbert); between Mzamba and Mtentu Rivers, dead (E6023: NMDP); off Port Grosvenor, 105 m, flat rocks, pebbles, mud, dead (C624: NMDP); same loc., 100–110 m, pebbles, some sand, dead (C605: NMDP); same loc., 120–128 m, coarse sand, some mud, solitary coral, shells, dead (C1154: NMDP); same loc., 120–128 m, coarse sand, some mud, solitary coral, shells, dead (C1155: NMDP); Mbotyi, beach drift (C8247: RK, D. Herbert); off Mgazi River, 100 m, coarse sand and rubble, dead (C2814: NMDP); off Whale Rock, 20–26 m, sand, gorgonians, dead (C3264).

Extralimital material: KENYA: near Mombasa, amongst coral rubble on exposed reef, live (HD6569).

Distribution: Kenya and Malagasy Republic to eastern Cape, South Africa (Port Alfred *fide* Turton, 1932),

Habitat: Littoral to bathyal depths (living from intertidal region to *ca.* 24 m; dead shells down to 200 m (see note below).

Remarks: Wagner (1983) erroneously reported that the holotype of *C. weberi* had been deposited in the ZMA. The holotype was originally in Bavay's personal collection (Bavay, 1904: 203), which after his death was auctioned by Gérets, a Paris dealer, and purchased by Dautzenberg. This specimen is now in the KBIN. However, Bavay mentioned a second individual, sent to him for identification by Weber; which is the one (with paratype status) now in the wet collection of the ZMA.

The microsculpture in *Laevichlamys weberi* changes with growth. Thus in early ontogeny, antimarginal striae are well developed and become transformed into intercostal shagreened microsculpture. However, the typical chlamiid, intercostal, commarginally lamellated microsculpture is lacking. In late ontogeny the shagreen microsculpture becomes more or less compressed into a reticulated microsculpture, sometimes abruptly transformed into intercostal antimarginal striae near the ventral margin, or else absent. The shagreen microsculpture of *L. weberi* is more prominent than in other species of *Laevichlamys.*

The southernmost samples dredged during the NMDP [off Mbashe River, 295–300 m (C8983) and off Kei R., 222 m (C4072)] represent old shells evidently originating in shell deposits from an early regression. The same may apply to most of the deeper water samples.

Genus *Pedum* Lamarck, 1799

Pedum [Bruguière] Lamarck, 1799: 88. Type species (M): *Ostrea spondyloidea* Gmelin, 1791 (SD by Schmidt 1818); Recent, 'India'.

Pedum spondyloideum (Gmelin, 1791)

(Figs 29–30)

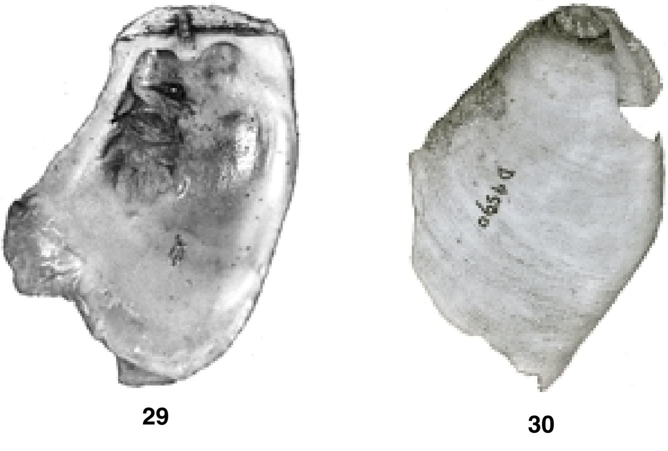
Ostrea spondyloidea Gmelin, 1791: 3335; Dillwyn,1817: 280. Type locality: 'India' (here restricted to Maluku, Indonesia; ZMA).

Pedum spondyloideum; Waller, 1972: 254, text figs 8, 21, 22, pl. 8, figs 136–143 (synonymy, description, distribution, ecology); Nielsen, 1986: 8, figs 3A–B (holotype refigured); Dijkstra & Knudsen, 1998: 79, pl. 5, figs 23–24 (further references, synonymy, type data, distribution).

Ostrea pedum Röding, 1798: 170. Type locality: unknown.

Pedum pedum; Roberts *et al.*, 1982: 116, pl. 34, figs 7–7a.

Description: Shell height to *ca.* 100 mm, (averaging 50–70 mm), shape rendered extremely variable by mode of life, transversely oblong in juvenile stage, elongate in



Figs 29–30. *Pedum spondyloideum* (Gmelin, 1791): NMSA D9590, between Bhanga Neck and Kosi Bay, Zululand, 6–18 m, pv, 36.5 x 23.4 mm. 29. LV interior. 30. RV exterior.

mature stage, RV more convex and laterally curved in mature stage, auricles of RV more distinct and unequal than of LV. LV with fine, irregularly spaced, scabrous radial riblets, very weak or absent near ventral margin in mature stage. Auricles not clearly differentiated. RV with microscopic scabrous radial riblets and laterally, closely spaced commarginal lamellae, more strongly developed near antero-marginal area in juvenile stage, smoother in late ontogeny. Dorsal margin of anterior auricle strongly curved, byssal fasciole broad, byssal notch rather deep, active ctenolium absent. Outer ligament strongly developed in ventral direction. Resilial insertion elongate, narrow and deflecting. Auricular crura absent. Colour whitish or creamy, with lateral and umbonal spots on RV, LV with purple or brown patches or streaks.

Type material: *O. spondyloidea*: holotype ZMUC BIV–57; seen by HD. *Ostrea pedum*: potentially in Museum der Natur at Gotha (Dance 1986: 206), but not traced (Mrs M. Joost pers. comm.).

Regional data (all NMSA: D. Herbert *et al.*): SOUTH AFRICA: *Zululand*: between Bhanga Neck and Kosi Bay, No. 13 reef, 6–18 m, in coral, live (D9589, D9590); Kosi Bay, 20–24 m (S1751); Sodwana Bay, Two Mile Reef, 10–15 m, in coral, live (E678).

Distribution: Coral reefs throughout the tropical Indo-Pacific, south-western limit northern Zululand.

Habitat: Living embedded in massive heads of scleractinian corals in shallow waters.

Remarks: *O. pedum* Röding, 1798, was based on an illustration in Favanne (1780: pl. 80, fig. K), which is similar to the type material of *O. spondyloidea.* The present specimens from South Africa also resemble the type material. For more information on morphology and ecology, see Yonge (1967: 311–323), Waller (1972: 254–258) and Kleemann (1990: 77–94).

Genus *Semipallium* Lamy, 1928

Semipallium [Jousseaume] Lamy, 1928: 169. Type species (OD): *Pecten tigris* Lamarck, 1819; Miocene-Recent; Indo-Pacific.

Semipallium coruscans coruscans (Hinds, 1845), **comb. n.**

(Figs 31p–32)

Pecten coruscans Hinds, 1845: 61, pl. 17, fig. 3; Reeve, 1853: pl. 33, fig. 149. Type locality: Port Anna Maria, Nukuhiva, Marquesas Islands, 13 m.

Chlamys coruscans; Kilburn & Rippey, 1982: 171, 216, textfig. 139, pl. 38, fig. 10; Steyn & Lussi ,1998: 212, fig. 856.

Chlamys coruscans coruscans; Waller, 1972: 231, pl. 1, figs 1–19, text figs 2, 12, 14 (synonymy, type data, description, functional morphology, ecology, distribution, discussion).

Pecten cuneolus Reeve, 1853: species 131, pl. 29, fig. 131; Küster & Kobelt, 1888: 232, pl. 61, fig. 9. Type locality: unknown (see note below).

Chlamys cuneolus; E. A. Smith, 1910: 212.

Pecten schmeltzii Dunker *in* Küster & Kobelt, 1888: 272, pl. 71, figs 5–6.

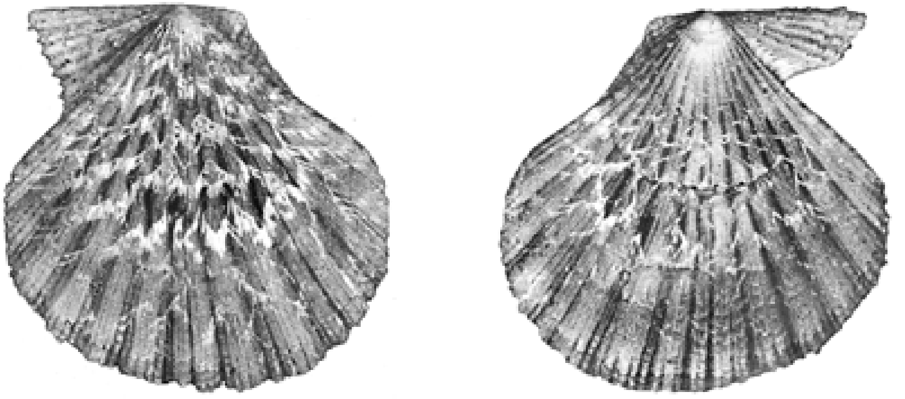
Pecten sulphureus Dunker *in* Küster & Kobelt, 1888 (*non Ostrea sulphurea* Gmelin, 1791): 276, pl. 72, figs 5–6 . Type locality: Viti-Inseln (Fiji).

Chlamys cellularis Oliver, 1915: 554, pl. 12, fig. 46. Type locality: Sunday Island (Raoul Island), Kermadec Islands.

Pecten eucosmia Turton, 1932: 222, pl. 57, fig. 1549. Type locality: Port Alfred, in driftwood.

Chlamys eucosmia; Barnard, 1964: 427, fig. 13b.

Description: Shell height to 20 mm (averaging 10–15 mm), orbicular to obliquely oblong, RV more convex than LV, auricles unequal, umbonal angle *ca.* 85–90°. Both valves



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Figs 31–32. *Semipallium coruscans coruscans* (Hinds, 1845): NMSA 2425, Durban, Natal, pv, 16.9 x 17.1 mm. 31. LV exterior. 32. RV exterior.

sculptured with 12–15 nearly regularly spaced, unequally developed, primary tripartite radial ribs, flanked with 1–2 intercostal secondary radial riblets near ventral margin. Epidermal microsculpture reticulated, when eroded more granulated, throughout growth. Anterior auricles larger than posterior with 4–8 radial riblets, posterior 2–4 weak riblets. Hinge line nearly straight, postero-dorsal auricle slightly declivous. Inner surface somewhat plicated, ventral margin crenated. Cardinal crura well developed. Auricular denticles (1–4) sometimes present on postero-marginal area, on antero-marginal area one. Byssal fasciole wide, byssal notch moderately deep. Active ctenolium well developed with 3–7 teeth (commonly 4–5). Colour variable, usually cream with white, red, purple or brown blotches or rays, plus a few unpigmented primary ribs; sometimes uniform white, yellow or red.

Type material: *P. coruscans*; lectotype BMNH 19709, designated by Waller (1972: 231). *P. cuneolus*: lectotype BMNH 1969140.1, designated by Waller (1972: 231); paralectotype, BMNH 1969140.2. *P. schmeltzii*: five possible syntypes MNHB. *P. sulphureus*: holotype MNHB. *P. eucosmia*: holotype OUZM Turton No. 1549. *C. cellularis*: holotype (lv) CM M.688. All seen by HD.

Regional data (all NMSA, unless otherwise stated, selected records): MOZAMBIQUE: off Pemba, 15 m, amongst coral rubble, sandy bottom, live (HD6472); Bazaruto Island, North Reef, under rocks, intertidal (G1384: E. Roscoe); Benguerua Island, Two Mile Reef, live (G2167: E. Roscoe); Baia dos Cocos, near Jangamo, live (V2640: J. Rosado); Inhaca Island, live (NMSA 4483: P. H. Boshoff). SOUTH AFRICA: *Zululand*: Between Bhanga Nek and Kosi Bay, 5–9 m, reef amongst algae (S1423: D. Herbert *et al.*); Kosi Bay, main reef, 1–4 km S of estuary mouth, 18–22 m, dead (S1047: D. Herbert *et al.*.); Sodwana Bay, Two-Mile Reef, outer ledge, 14–17 m, live (D5095: D. Herbert); Ledsman Shoal, 20 m, on dead *Acropora* coral head (B3009, ex CSIR Water Research Unit); same data, 15 m, inside compacted coral rubble and sand, live (E2260: Oceanographic Research Institute). *Natal* : off Durban Bluff, 20–22 m, dead (B5457: RK, R. Fregona); Durban, dead (NMSA 2425: H. C. Burnup, recorded by E. A. Smith 1910); off Umlaas Canal, 75 m, muddy sand (D1624: NMDP); Isipingo (4482: H. C. Burnup); Aliwal

Shoal, off Scottburgh, 10–20 m, sand, dead (S8037: D. Herbert); Ifafa (2426: H. C. Burnup); Port Shepstone, dead (NMSA 4484: H. C. Burnup).

Distribution: Throughout tropical Indo-West Pacific, as far south as southern Natal, although not yet recorded from the Red Sea and Persian Gulf. Turton's specimen from Port Alfred (described as *Pecten eucosmia*) was taken from a drift log, and does not demonstrate its occurrence south of KwaZulu-Natal.

Habitat: Living byssally attached to rocks or corals, often nestling in crevices, commonly in shallow waters (intertidally to about 20 m).

Remarks: Reeve (1853) described *P. cuneolus* from an unknown locality; the locality 'Durban', subsequently scribbled on the type label by E. A. Smith, refers to a specimen sent to the latter by Burnup, and does not reflect the likely origin of Reeve's material.

P. cuneolus, *P. schmeltzii* and *P. sulphureus* are in all respects similar to *P. coruscans*. HD has examined possible syntypes (5 specimens) of *P. schmeltzii* from Fiji and Upolu (Samoa) in MNHB; the figured specimen is not present in LMA. The figured holotype (a yellow specimen) of *P. sulphureus* (MNHB) is labelled '*Pecten sulphureus* Dkr Viti Ins.'. *C. cellularis* from the Kermadec Islands, although somewhat more solid and oblique than typical *S. coruscans* (Dijkstra & Marshall, 1997), appears to be another synonym. The holotype of *P. eucosmia* from Port Alfred also agrees well with the types of *Pecten coruscans* (for *P. eucosmia sensu* Boshoff 1965, see *Volachamys fultoni*).

The morphological characters of *Pecten coruscans* conform most closely to those of genus *Semipallium*.

Semipallium crouchi (E. A. Smith, 1892)

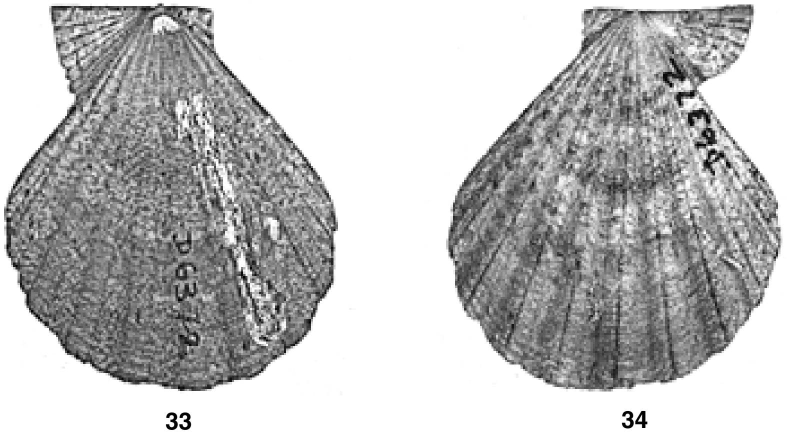
(Figs 33–34)

Pecten crouchi E. A. Smith, 1892: 255, fig. Type locality: Mauritius.
Chlamys (*Manupecten*) *crouchi crouchi*; Eames & Cox, 1956: 48.
Semipallium crouchi; Wagner, 1989: 112, 115, fig. 9 (holotype); Dijkstra & Knudsen, 1998: 80, pl. 6, fig. 29 (further references, type data, distribution, discussion).

Description: Shell height to 60 mm (average *ca.* 40 mm); moderately convex, LV more so than RV, elongate, slightly oblique, inequilateral, auricles very unequal, umbonal angle *ca.* 80–85°. LV with 7 prominent radial costae, plus one narrow costa on each anterior and posterior margin; costae narrower than their intervals. Secondary radial riblets are developed on costae and in the intervals, sometimes almost invisible due to the surficial shagreen microsculpture. Anterior auricle larger than posterior (*ca.* 2.5:1), sculptured with *ca.* 10 irregularly placed radial riblets, posterior auricle with 3–5. RV with 8 prominent radial costae, broader than their intervals. Secondary riblets and microsculpture as on LV. Anterior auricle sculptured with 6–8 irregularly placed radial riblets, posterior with 2–3. Hinge line straight, except on postero-dorsal margin (slightly inclined). Antero-dorsal margin pustular or tubercular. Byssal fasciole relative small, byssal notch shallow. Active ctenolium with 5–7 teeth on suture. Resilifer elongate, obliquely triangular. Auricular crura rather small. Inner surface strongly plicated, semitransparent, and yellowish near ventral margin. Colour cream with brown or purple markings.

Type material: see Dijkstra & Knudsen (1998).

Regional data: SOUTH AFRICA: *Zululand*: off Rocktail Bay, 75 m, sandstone rubble, live (D6372).



Figs. 33–34. *Semipallium crouchi* (Smith, 1892): NMSA D6372, off Rocktail Bay, Zululand, 75 m, pv, 25.0 x 21.8 mm. 33. LV exterior. 34. RV exterior.

Distribution: Tropical western Indian Ocean from the Red Sea to northern Zululand (South Africa) and Rèunion Is.

Habitat: Usually living littorally or in shallow water amongst coral rubble or under coral boulders on sandy bottoms.

Remarks: The present specimen resembles the holotype of *S. crouchi*, and is a new record for South Africa. Another tropical Indo-Pacific species, *Semipallium dianae* (Crandall, 1979) closely resembles *S. crouchi*, but differs slightly in ribbing (sometimes with one additional rib) and in coloration (brighter and more variable).

Semipallium flavicans (Linnaeus, 1758)

(Fig. 35)

Ostrea flavicans Linnaeus, 1758: 698; Dijkstra, 1999: 425, fig. 9C–D (lectotype). Type locality: 'in O. australiore'.

Pecten tigris Lamarck, 1819: 171; Dijkstra, 1994: 482, figs 70–74 (lectotype). Type locality: 'l'Océan indien?', here emended to Maluku, Indonesia (specimens in BMNH, MNHN, ZMA).

Semipallium tigris; Dijkstra, 1998: 38, pl. 7, figs 6–9 (references, type data, distribution).

Description: Shell height 60 mm (average *ca.* 40 mm), obliquely elongate, RV more convex than LV, inequilateral, auricles unequal, umbonal angle *ca.* 80–90°. Both valves with prominent radial plicae (9–10), ribs and interstices with secondary tuberculated or spiny radial riblets, covered by shagreened (reticulated) microsculpture (more granulated in eroded state). Anterior auricles larger than posterior, with numerous radial riblets (*ca.* 12–15 on anterior, *ca.* 5–8 on posterior). Hinge line straight. Resilifer oblong, slightly oblique, triangular. Cardinal crura weak. Byssal fasciole moderately wide, byssal notch rather deep. Active ctenolium with 5–7 teeth on suture. Internal surface somewhat plicated. Colour whitish, creamy or yellowish with brown or red maculations, RV paler, interior umbonal area usually spotted dark brown, auricular denticles usually reddish, plicae yellowish.

Type material: *O. flavicans:* lectotype, des. Dijkstra (1999) in UUZM. *P. tigris*: lectotype MNHN (unregistered) des. Dijkstra (1994: 483), paralectotype MNHN (unregistered).

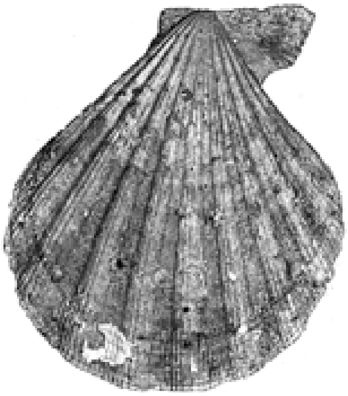


Fig. 35. *Semipallium tigris* (Lamarck, 1819): NMSA D7518, off Boteler Point, Zululand, 78 m, 50.4 x 44.8 mm, RV exterior.

Regional data: MOZAMBIQUE: Nacala (NMSA: H. Boswell); same loc., 10–12 m, amongst coral rubble, sand, live (HD6468). SOUTH AFRICA: *Zululand*: off Boteler Point, 78 m, coarse sand, dead (NMSA D7518: NMDP).

Distribution: Throughout most of tropical Indo-West Pacific, south-western limit northern Zululand; not yet known from the Red Sea, Hawaii or French Polynesia (Dijkstra 1989).

Habitat: Living byssally attached to corals or amongst coral rubble on sandy bottoms at littoral to sublittoral depths.

Remarks: Dijkstra (1999) demonstrated that the earliest available name for the species commonly known as *Semipallium tigris* is *Ostrea flavicans* Linnaeus, 1758.

Genus *Talochlamys* Iredale, 1929

Talochlamys Iredale, 1929: 164. Type species (OD): *Chlamys famigerator* Iredale, 1925 (= *Pecten pulleineanus* Tate, 1887); off Green Cape, New South Wales, 50–70 fath. (91–128 m).

Talochlamys humilis (G. B. Sowerby 3rd, 1904), **comb. n.**

(Figs 36–37)

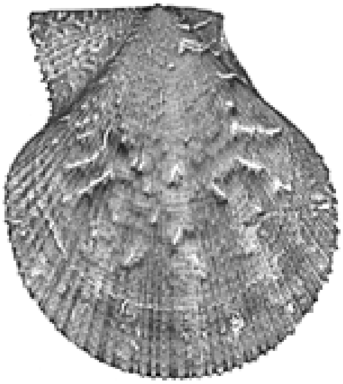
Chylams [*sic*] *humilis* Sowerby, 1904: 3, pl. 6, figs 3. Type locality: 65 mi. off Cape St. Blaize, N by E + E (= S by W + W), Agulhas Bank, 90 fath. (165 m).

Chlamys humilis; E. A. Smith, 1906: 59; Kilburn & Rippey, 1982: 216; Lussi, 1995: 2, fig. 7.

Chlamys tincta [in part]; Barnard, 1964: 424; *idem*, 1974: 761.

Chlamys (*Chlamys*) *humilis*; Wagner, 1983: 145–148, figs 2, 6–8 (references, type data, description, discussion).

Description: Shell height to *ca.* 25 mm (averaging 15–20 mm), suborbicular to elongate, RV somewhat more convex than LV, inequilateral, auricles strongly unequal, umbonal angle *ca.* 85–90°. Both valves sculptured with numerous, closely spaced, rounded, squamous radial costae (*ca.* 55–70). Preradial stage of LV with microscopic antimarginal striae and commarginal growth ridges, on RV nearly smooth. Intercostal antimarginal striated microsculpture throughout, intercostal commarginal lamellated microsculpture on central part of disc. Anterior auricle of LV with 8–10 squamous radial riblets with weak interstitial antimarginal microsculpture, posterior with 3–5 weakly squamose radial riblets and more prominent antimarginal microsculpture. Anterior auricle of RV with



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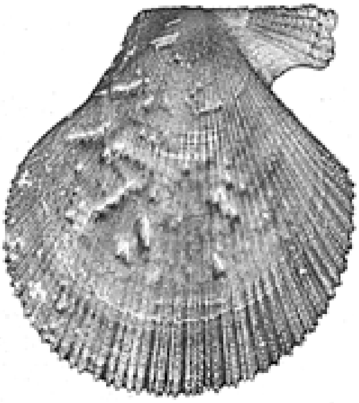

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Figs 36–37. *Talochlamys humilis* (Sowerby, 1904): NMSA V754, S of Cape St Blaize, Agulhas Bank, 101 m, pv, 23.1 x 20.9 mm. 36. LV exterior. 37. RV exterior.

5–6 lamellated radial riblets, on posterior auricle very weak, with or without 3–5 spinous radial riblets, antimarginal striated microsculpture well developed. Hinge line straight, somewhat declivous on antero-dorsal margin. Byssal fasciole broad, byssal notch rather deep, active ctenolium with 4–7 prominent teeth on suture. Auricular crura well developed; resilifer triangular-oblong. Colour strongly variable, uniform cream, yellow, orange, reddish, pinkish, purplish or brownish, also with dark or light rays and pale streaks.

Type material: Lectotype SAM 14858, designated by Wagner (1983: 145, fig. 2); paralectotype BMNH 1904.12.23.163. Seen by HD.

Wagner (1983: 145) selected the SAM syntype as lectotype, although it was only Sowerby's second mentioned specimen. He selected two valves in the BMNH type lot as paralectotypes, and identified these as '*Chlamys tincta*'. However, Waller has pointed out (pers. comm., 1977) that these valves do not match, and that only the RV was a potential lectotype. During a visit to the BMNH (pers. comm., 1986) HD was able to trace the missing LV, which proved to have been accidentally transposed with a LV of the type lot of *Pecten altus* Reeve, 1853. Although the BMNH type specimen matches Sowerby's original description and measurements, Wagner's lectotype designation must stand.

Regional locality data (all NMSA: NMDP, unless otherwise stated, selected records only): SOUTH AFRICA: *Transkei*: off Sandy Point, 135–144 m, marine growths, dead (C5029). *Agulhas Bank*: off Nahoon, 85 m, medium sand, broken shell, dead (B8395); off Kidd's Beach, 90 m, coarse sand, sponge, live (B7795); off East London, 100 m, live (B7806); off East London, 90 m, sponges, gorgonians, live (B8219); off Storms River, 117 m, *ex pisce* (V1431); E of Plettenberg Bay, 72 m, thick mud with agglutinated worm tubes and large rocks, live (V3219); SE of Plettenberg Bay, 109 m, live (V147); SE of Tsitsikamma, 115 m, coarse sand and shell gravel, dead (V3488); SSE of Knysna, 101 m, living bryozoan corals, sand and shell gravel, live (V981); same loc., 103 m, bored rocks, hard clay, live (V3302); SE of Knysna, 99 m, live (V1117); S of Cape St Blaize, 101 m, *ex pisce*, dead (V1303); S of Gouritz River mouth, 108 m, living between folds of bryozoan (V754); SSE of Cape Infanta, 91 m, coarse shell grit, dead (V676).

Distribution: Endemic to Agulhas Bank of South Africa as far east as western Transkei. Habitat: Continental shelf from about 70–140 m, living byssally attached to rocks, bryozoans and other growths.

Remarks: Barnard (1964: 424) treated *T. humilis* as a junior synonym of *Pecten tinctus* Reeve, 1853 [=*T. multistriata* (Poli, 1795)], but Kilburn & Rippey (1982: 216) gave reasons for regarding it as a valid species. The sculpture of *humilis* (interstitial antimarginal striae and commarginal lamellae) agrees better with that found in genus *Talochlamys* than in *Chlamys* (in which there is interstitial shagreened or reticulated microsculpture).

T. humilis appears to be an important prey species of the horsefish *Congiopodus torvus* (Gronovius, 1772), from whose gut large samples have been taken.

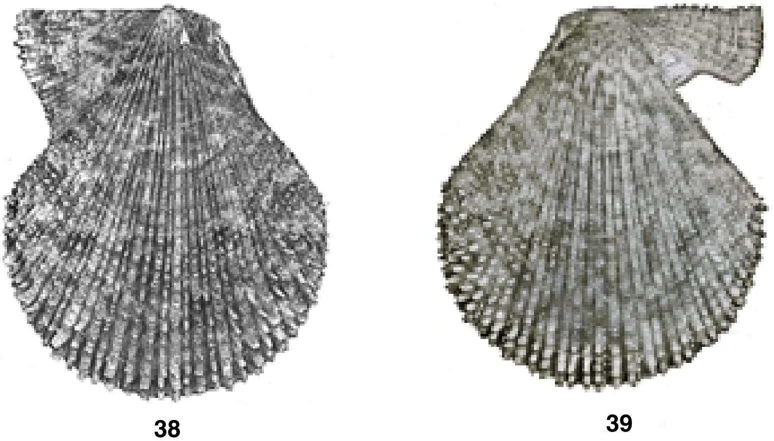
Talochlamys multistriata (Poli, 1795), **comb. n.**

(Figs 38–39)

Ostrea multistriata Poli, 1795: 164, pl. 28, fig. 14. Type locality: Sicily, Italy.
Chlamys (*Chlamys*) *multistriata*; Wagner (1991): 29 (synonymy, variations).
Crassadoma multistriata; Waller, 1993: 212, figs 5a, d, g, 6c–j (synonymy, type data, description, distribution, discussion).
Pecten tinctus Reeve, 1853: pl. 26, fig. 106; Turton, 1932: 222, pl. 57, no. 1550; Waller, 1993: 212, 213, figs 6e–f (lectotype). Type locality: unknown.
Chlamys tincta; E. A. Smith, 1906: 59; van Bruggen, 1952: 13, figs 3, 3a; Barnard, 1964: 424, fig. 14b; *idem*, 1974: 761; Boshoff, 1965: 134, pl. 14, fig. 8; Kilburn & Rippey, 1982: 171, fig. 138, pl. 38 fig. 12; Lussi, 1995: 2, fig. 26; Steyn & Lussi, 1998: 212, fig. 858.
Chlamys (*Chlamys*) *tincta*; Wagner, 1983: 145, 148, figs 3–5 (type data).
Pecten effulgens Reeve, 1853: pl. 33 fig. 156; Waller, 1993: 212, 213, figs 6g–h (lectotype). Type locality: unknown.
Pecten textilis Reeve, 1853: pl. 35, fig. 174; Waller, 1993: 212, 213, fig. 6i (lectotype). Type locality: unknown.
Pecten pusio var. *alba* [*sic*] G. B. Sowerby 3rd, 1889 (*non Pecten fumatus* var. *albus* Tate, 1887): 15. Type locality: Port Elizabeth, South Africa.

Description: Shell height to *ca.* 35 mm (averaging 15–20 mm), elongate, RV slightly more convex than LV, inequilateral, auricles very unequal, umbonal angle *ca.* 80–90°. Both valves sculptured with numerous (50–80) irregularly spaced, squamous or spiny radial costae. Antimarginal intercostal striated microsculpture throughout ontogeny, more prominent in broader interstices near ventral margin, commarginal intercostal lamellae restricted in early radial growth stages to central part of disc, more prominent on RV. Anterior auricle of LV with 7–15 spinose radial riblets, posterior auricle with 5–7 fine spinose radial riblets; anterior auricle of RV with 4–7 scabrous radial ribs, posterior one finer and more spinose. Hinge line straight, somewhat sloping near postero-dorsal margin. Byssal fasciole broad, byssal notch rather deep, active ctenolium with 5–8 prominent teeth on suture. Resilifer triangularly elongate. Colour very variable, orange, purple, white, brown or yellow, usually with pale lines or zones.

Type material: *O. multistriata*: Poli's figure (1795: pl. 28, fig. 14) was designated as lectotype by Waller (1993). *P. tinctus*: lectotype BMNH 1981247/1 designated by Waller (1993), paralectotypes BMNH 1981247/2-3. *P. effulgens*: lectotype BMNH 1993039/1 designated by Waller (1993), paralectotype BMNH 1993039/2. *P. textilis*: lectotype



Figs 38–39. *Talochlamys multistriata* (Poli, 1795): HD 3082, False Bay, 8–12 m, pv, 21.9 x 18.5 mm. 38. LV exterior. 39. RV exterior.

BMNH 1993040/1, designated by Waller (1993), paralectotype BMNH 1993040/2. *P. pusio* var. *alba*: types lost? (not in OUZM).

Regional locality data (all NMSA: NMDP unless otherwise stated, selected records only): SOUTH AFRICA: *Natal*: off Sheffield Beach, 70 m, muddy sand, dead (C9339); off Umlaas Canal, 100 m, coarse sand, dead (D1208); off Amanzimtoti, 260-270 m, medium sand, dead (D1174); same loc., 180 m, medium sand, dead (D1234); same loc., 115–125 m, medium sand, dead (D1263); same loc., 160-170 m, medium sand, dead (D1486); off Park Rynie, 140 m, some sand, sponge rubble, dead (C1580); SE of Umzimbazi River, 65 m, fine sand, dead (D3747). *Transkei*: off Mtamvuna River, 100 m, sponge rubble, dead (C5479); off Port Grosvenor, 100–115 m, sand, some mud, solitary coral, shells, dead (C1342); off Mbotyi, 45–50 m, mixed mud, sand, some rocks, gorgonians, few sponges, dead (C385); off Mgazi River, 190 m, glutinous black mud, dead (C8777); off Whale Rock, 72–78 m, loose rocks, sand, shell debris, dead (C3144); off Shixini Point, 70–75 m, coarse sand, broken shells, dead (C4422); off Nthlonyane River, 300 m, medium sand, dead (C8699); same loc., 345–400 m, fine sand, dead (C9209); off Qora River, 400 m, sand, dead (C4896); same loc., 350–360 m, muddy sand, small quantity broken shells, dead (C6722); same loc., 400–420 m, coarse slightly muddy sand, dead (C6862); same loc., 96 m, gorgonians, sponges, dead (C4660). *Eastern Cape*: off Nahoon, 85 m, medium sand, broken shell, dead (B8395); S of Cape Recife, 360–400 m, clean shell grit with much shallow-water shell debris, dead (V3355); Port Alfred, beach drift (B5633, B5631, B680: J. Hutt, E. K. Jordan); Port Elizabeth, beach drift (5014: RK); Jeffreys Bay, beachdrift (4996: RK). *Tsitsikamma Coast*: Sedgefield, near Knysna, beach drift (A997: RK); off Cape Infanta, 30 m, sandstone, broken shell (S9121). *Overberg*: off Struis Bay, 30 m, sponges, stones, live (S7887); Hawston, near Hermanus, 23 m, reef, live (E6391: D. Herbert). *False Bay*: off Macassar Beach, 30 m, rock, coarse sand, live (S8164); Strandfontein, beach drift (A3980: C. Connolly); Glencairn, live (4999, A3561: C. Connolly); Simonstown, live (5013: RK); Buffels Bay, 1-2 m among tubeworms, live (E6502: V. Millard). *Atlantic Cape*: Sea Point, Table Bay, among *Ecklonia* holdfasts, live (A2252: RK).

Distribution: Wide latitudinal range from Mediterranean and temperate eastern Atlantic to KwaZulu-Natal coast of South Africa, with an apparent gap between Namibia and Table Bay.

Habitat: Subtidal to inner continental shelf, living byssally attached to hard substrates (under rocks or stones), in the holdfasts of giant kelp, on tunicates or between rubble, often on soft bottoms.

Remarks: The present species is variable in outline and sculpture, and often distorted or deformed from its habit of nestling in crevices.

Southeastern Atlantic and South African specimens usually have a narrower umbonal angle (*ca.* 80-85°) and larger anterior auricles with more numerous radial riblets (*ca.* 12–17) than typical specimens from Mediterranean waters, but sculpture and microsculpture are identical. Intermediate variation is also observed (see Waller 1993: 213). Although Waller (1993) also recorded *T. multistriata* from 'off southern Mozambique', based on material housed in the USNM, our data does not indicate a range extending anywhere that far north or into the tropical waters of SE Africa. Perhaps this material is mislocalised or based on examples of the superficially similar *Laevichlamys deliciosa.*

Although *multistriata* has been referred to *Chlamys* by most authors (see synonymy), it lacks the shagreened interstitial microsculpture of that genus. Recently Waller (1993) transferred *multistriata* to *Crassadoma* Bernard, 1986, in the subfamily Chlamydinae, The latter genus occurs in the northeastern Pacific, and no fossil or Holocene *Crassadoma* species appear to be known from the Indo-West Pacific region (Waller 1993). Adults of *Crassadoma* are cemented by the RV, and species are sculptured with prominent widely spaced intercostal commarginal lamellae; intercostal antimarginal striae are only produced on the flanks of the ribs near the posterior margin, most prominently on the RV. *Talochlamys* species are known from the Holocene of the Indo-Pacific (Dijkstra 1993: 24–28; Beu 1995: 17–19). In this genus antimarginal intercostal striae are developed throughout ontogeny and closely spaced intercostal commarginal lamellae are present at least in the early radial growth stage. Similar characters occur in *multistriata*.

Valves dredged in 300–420 m, mainly off Transkei, are doubtlessly derived from a Pleistocene regression; they tend to be slightly atypical in their more prominent commarginal lamellae in the early radial stage, and their smaller radial riblets.

Genus *Veprichlamys* Iredale, 1929

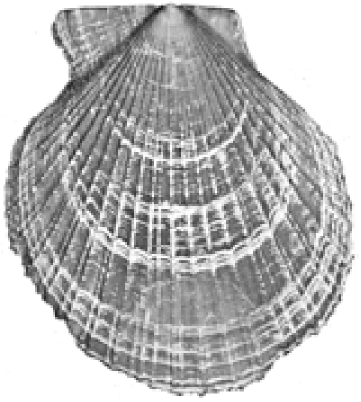
Veprichlamys Iredale, 1929: 164, 188 (proposed as a subgenus of *Mimachlamys*). Type species (OD): *Chlamys perillustris* Iredale, 1925; Recent, off Victoria, Australia, 274–457 m.

Veprichlamys africana sp. n.

(Figs 40–43)

Description of holotype (RV): Shell fragile, up to 36 mm high, obliquely ovate, rather compressed, inequilateral, auricles unequal, umbonal angle *ca.* 90°. RV sculptured with numerous (*ca.* 25) irregularly spaced, radial costae on central part of disc, increasing to *ca.* 50 near ventral margin, commencing at 2 mm shell height. Radial costae squamose. Preradial stage smooth (somewhat eroded). Intercostal microsculpture of antimarginal striae. Anterior auricle larger than posterior, sculptured with 4 prominent squamose radial riblets, one weak radial riblet on posterior auricle. Anterior dorsal margin with prominent scales. Hinge line straight. Inner surface somewhat plicate. Resilifer triangularly oblong. Auricular crura well developed. Byssal notch rather deep, byssal fasciole broad. Active ctenolium with 5 teeth on suture. Colour exterior creamy, interior nacreous.

Additional description of paratype (LV) (NMSA 5735): Shell fragile, up to 41 mm high, somewhat obliquely ovate, rather compressed, slightly inequilateral, auricles unequal, umbonal angle *ca.* 90°. LV sculptured with *ca.* 20 regularly spaced, primary radial costae on central part of disc, increasing with numerous secondary intercalated radial riblets (*ca.* 20) near ventral margin, commencing at 1 mm shell height. Radial costae squamose. Preradial microsculpture of fine commarginal lamellae, intercostal



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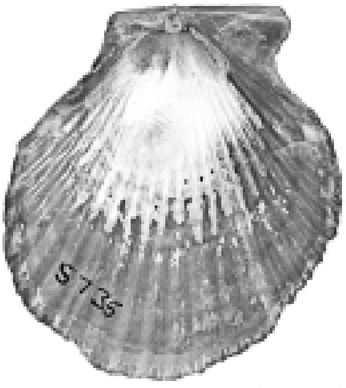

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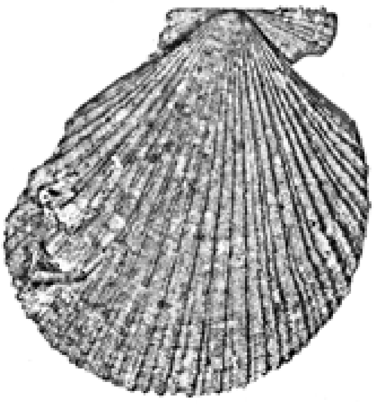

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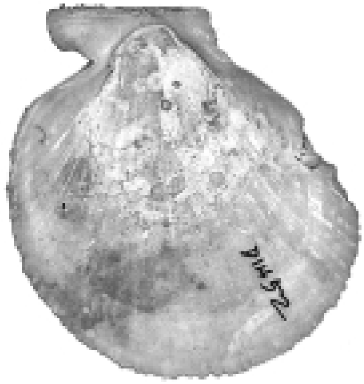

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Figs 40–43. *Veprichlamys africana* sp. n. 40–41. Paratype, NMSA 5735, off Natal, 40.6 x 36.0 mm. 40. LV exterior. 41. LV interior. 42–43. Holotype, NMSA D1452, off Amanzimtoti, Natal, 350 m, 35.9 x 31.5 mm. 42. RV exterior. 43. RV interior.

microsculpture of irregular antimarginal striae. Anterior auricle larger than posterior, sculptured with 5 prominent squamose radial riblets, 2 weak radial riblets on posterior. Auricular microsculpture of irregular antimarginal striae. Hinge line straight, posteriorly somewhat declivous. Inner surface plicate. Resilifer oblique oblong, resilial teeth very weak, dorsal teeth absent. Auricular crura well developed. Colour exterior greyish, interior silky.

Type locality: SOUTH AFRICA: *Natal*: off Amanzimtoti, 30°02.9'S, 31°05.8'E, 350 m, muddy sand, NMDP Stn XX67, 9.vii.1985.

Type material: Holotype NMSA D1452/T1728, RV, data as above, dimensions H 35.9 mm, L 31.5 mm. Paratypes (6 LV, 5 RV in total): MOZAMBIQUE: 60 miles S of Zavora, 130 miles E of Inhaca, 494 m, dead, leg. A. Krige, don. K. Eastwood (NMSA 8221/T1679: 1 RV); Ponta da Barra Falsa, 275–350 m, mud, dead, 1996 (ZMA Moll. 3.99.003: 1 LV + 1 RV). SOUTH AFRICA: *Natal*: same data as holotype (NMSA V7830/T1729: 1 LV + 1 RV); off Natal, dead, R. Cruickshank, v. 1970 (NMSA 5735/T1706: 1 LV). *Transkei*: off Whale Rock, 32°00.9'S, 29°21.8'E, 400–420 m, coarse sand, old shell debris, stones, dead, NMDP Stn M7, 20.vii.1982 (NMSA V7152/T1730: 2 LV + 1 RV); off Mendu Point, 32°22.0´S, 29°01.2´E, 405–420 m, fine sand, dead (NMSA C5009/T1727: 1 LV); off Qora River, 400 m, sand, dead, NMDP Stn U8, 14.vi.1983 (NMSA C6587/T1726: 1 RV).

Distribution: Continental slope of southern Mozambique to eastern Transkei.

Habitat: At present only single valves are known, from *ca.* 350–500 m on coarse sand or mud.

Discussion: *Veprichlamys africana* differs from the Australian *V. perillustris* (Iredale, 1925) in its more ovate to orbicular shape (*V. perillustris* is more obliquely ovate), in having more numerous secondary intercalated radial riblets, which are almost absent in *V. perillustris*, and by the more prominent antimarginal microsculpture. *Veprichlamys kiwaensis* (Powell, 1933) of New Zealand resembles *V. africana* most closely, but differs in having a more obliquely ovate shape, having fewer intercalated secondary radial riblets, by its more numerous commarginal lamellae in the preradial stage, and by having finer antimarginal intercostal striae. The Japanese *Veprichlamys jousseaumei* (Bavay, 1904) differs from *V. africana* in its smaller size (height <25 mm) and more orbicular shape, in its more numerous, regularly spaced, primary radial costae (*ca.* 30-38), and in its fewer secondary intercalated radial riblets. *Veprichlamys incantata* (Hertlein, 1972) from the Galapagos differs from *V. africana* mainly in attaining a larger size (up to *ca.* 55 mm high), in its more numerous secondary intercalated radial riblets, and in having more prominent and erect scales on the radial costae. *Veprichlamys versipellis* Dijkstra & Kastoro, 1997, of Indonesia, differs from *V. africana* in having a reticulated microsculpture in its early radial stage and a finer antimarginal microsculpture in the late radial stage, and by having larger auricles.

Etymology: Latin *africanus*, adj. = African.

Remarks: The available specimens from Mozambique and northern South Africa are all dead-collected and somewhat corroded, especially those from South Africa. It is presumed that *Veprichlamys africana* inhabits deeper bathyal waters, like *V. perillustris* (in *ca.* 460 m) and *V. kiwaensis* (to *ca.* 1000 m) (unpublished data, Dijkstra). However, it is not impossible that in the case of *V. africana* these valves have been derived from Pleistocene deposits by slope erosion.

Tribe Mimachlamydini Waller, 1993

Genus *Mimachlamys* Iredale, 1939

Mimachlamys Iredale, 1939: 162. Type species (OD): *Pecten asperrimus* Lamarck, 1819; Recent, W Australia.

Mimachlamys sanguinea (Linnaeus, 1758)

(Figs 44–45)

Ostrea sanguinea Linnaeus, 1758: 698; Dijkstra, 1999: 413 (identity), Figs 4 A-B (lectotype). Type locality: 'in O. australiore' [= Moluccas (Maluku). Indonesia, designated Dijkstra 1999].

Ostrea senatoria Gmelin, 1791: 3327 (based on Chemnitz 1784: 320, pl. 65, fig. 617 [non-binomial]). Type locality: 'Oceano indico'.

Pecten senatorius; Paes da França, 1960: 90, pl. 21, fig. 1.

Chlamys senatoria; Barnard, 1964: 430; Spry, 1964: 15, pl. 2, fig. 71; Oliver, 1992: 74, pl. 13, figs 1a–b; 1995: 230, fig. 1003; Steyn & Lussi, 1998: 212, fig. 61.

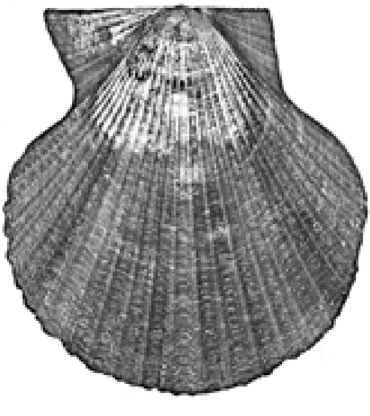
Chlamys senatorius [*sic*]; Boshoff, 1965: 135.

Mimachlamys senatoria; Dijkstra & Marshall, 1997: 101, pl. 9, figs 1–4 (references, synonymy, type data, distribution, discussion); Dijkstra & Knudsen, 1998: 83 (further references and synonymy), pl. 4, fig. 16.

Pecten testudineus Reeve, 1853: pl. 34, fig. 160. Type locality: 'Amboyna' (Ambon, Maluku, Indonesia).

Chlamys testudineus [*sic*]; E. A. Smith, 1910: 212.

Description: Shell height to 80 mm (average *ca.* 60 mm), suborbicular, LV more convex than RV, slightly equilateral, auricles unequal, umbonal angle *ca.* 90°. Both valves sculptured with numerous, regularly spaced, squamous primary radial ribs (22–27, usually 24), flanked by fine squamous secondary radial riblets, starting in the central part of the disc, and duplicating (or sometimes triplicating) near the periphery. Intercostal microsculpture with irregularly interrupted longitudinal or divaricating scratches on the central part, more antimarginal on the antero- and postero-marginal parts. Auricles with several homogeneous scaly riblets (6–10), more prominent on anterior one. Hinge line straight. Inner surface plicated near ventral margin. Cardinal crura well developed,



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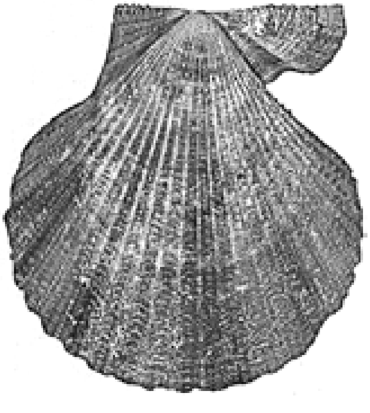

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Figs 44–45. *Mimachlamys sanguinea* (Linnaeus, 1758): NMSA G3464, Benguera Is., Mozambique, pv, 53.2 x 50.1 mm. 44. LV exterior. 45. RV exterior.

resilial teeth strong. Resilifer elongate, triangular and oblique. Byssal fasciole wide, byssal notch deep. Active ctenolium well developed with strong teeth (4–7) on suture. Colour extremely variable, either patterned or uniform.

Type material: *O. sanguinea*: lectotype, designated Djikstra 1999, in LSL, paralectotypes in LSL and MSNP. O. *senatoria*: lectotype ZMUC BIV-45, designated by Dijkstra & Marshall (1997: 102). *P. testudineus*: 3 syntypes BMNH (unregistered). See also Dijkstra & Knudsen (1998).

Regional data (all NMSA unless otherwise stated, selected records only): MOZAMBIQUE: Moçimboa da Praia (G4951, G4956: A. Ramalho); Quirimba Is. on *Thalassodendron* at LST, covered in dark red sponge, live (K435: RK); off Pemba, 15–18 m, muddy sand, live (HD6473); Nacala Bay, S Belmore, 1 m, small rock amongst *Thalassodendron*, live (H4506: K. J. Grosch); SW Lunga Bay, *Thalassodendron*, 0.6 m, gravelly sand, live (H4497: K. J. Grosch); Conducia Bay (H4668: K. J. Grosch); SW Conducia Bay, washed up during cyclone (H4500, H4667: K. J. Grosch); Conducia Bay (H4668: K. J. Grosch); SW Conducia Bay, NW of Choca, 0.6 m, *Thalassodendron*, muddy sand, on pebble, live (H4495: K. J. Grosch); SW Conducia Bay, Conducia, 1.5 m, *Thalassodendron* flat, on small rock, live (H4502: K. J. Grosch); Mozambique Bay, S Chembas, 0.6 m, *Thalassodendron* with rocks, muddy gravel (H4499: K. J. Grosch); W shore Mozambique Island, on *Thalassodendron* in soft sand (H4493: K. J. Grosch); Bazaruto Is., live, 25–30 m, muddy sand and rubble (HD4392); Benguera, North Bay (G3464: E. Roscoe); Santa Carolina Island, West Reef (G960: E. Roscoe); reef between Santa Carolina Island and mainland (G4630: E. Roscoe); between Bazaruto Island and mainland, 3–15 m, in sponge, live (F7914: R. Cruickshank); off Inhassoro, 3–15 m, live (F8762: R. Cruickshank); Inhambane (F7106: R. Cruickshank); Inhaca Island, on *Thalassodendron* on muddy sandflats (9577: RK), same loc. (4487: P. Boshoff). SOUTH AFRICA: *Zululand*: SE of Kosi Bay, 48 m, sand and rubble, live (D8731); same loc., 45 m, sand, stones, large algae, live (S4836); same loc., 50 m, medium sand, algae, dead (D6236); off Dog Point, 74 m, sandstone rubble, gorgonians, live (S6520); off Gypsey Hill, 52 m, fine sand, dead (S5231: NMDP); SE of Rocktail Bay, 60 m, coarse sand, dead (S5231: NMDP); off Sodwana Bay, 61 m, sand, dead (S3852: NMDP); Two Mile Reef, Sodwana Bay, 10–15 m, deep crevice in rock, live (D5200: D. Herbert). *Natal*: Durban (2412-3, 4480: H. C. Burnup); off Amanzimtoti, 180 m, medium sand, dead (D1234); Aliwal Shoal, off Umkomaas, 25–28 m, dead (S8807: D. Herbert). *Transkei*: off Whale Rock, 150–165 m, coarse sand, discoid corals, dead but in fresh condition (C2346).

Distribution: Throughout the tropical Indo-West Pacific (except Hawaii and French Polynesia) to southern Natal (with single record off Transkei).

Habitat: Living byssally attached to rocks or corals (in deep crevices it may dispense with a byssal anchor); in Mozambique generally attached to the marine angiosperm *Thalassodendron* on sand or muddy sandflats at LST or in a few metres. Toward the southern end of its range it inhabits deeper water, presumably correlated with the progressively offshore flow of the warm Agulhas current. Individuals may have a mutualistic relationship with sponges of the genera *Mycale and Callyspongia* (Van Soest 1994).

Remarks: *Mimachlamys sanguinea*, better known as *Chlamys* s*enatoria*, is a common, widely distributed, polymorphic and polychromatic Indo-West Pacific species. Not only has it attracted numerous synonyms, but it has been confused with other species, such as *M. crassicostata* (G. B. Sowerby 2nd, 1842) and *M. gloriosa* (Reeve, 1853). *M. crassicostata* (= *P. nobilis* Reeve, 1852) from the N. W. Pacific differs from *M. sanguinea* mainly in size (up to *ca.* 130 mm high), higher, more angular plicae and less well-developed secondary sculpture. *M. gloriosa* from the SW Pacific differs from *M. sanguinea* in having stronger lamellate sculpture on the primary ribs, and reduced secondary radial riblets which are developed only in late ontogeny (near periphery). The present specimens from Mozambique are morphologically similar to the type material of *M. sanguinea*, although the lamellae on the radial ribs are more prominent and more widely arranged.

The *M. sanguinea*-complex is still under study and will be treated elsewhere in more detail.

Tribe Aequipectinini Waller, 1993

Genus *Aequipecten* Fischer, 1886

Aequipecten Fischer, 1886: 944 (proposed as a section of *Chlamys*). Type species (M): *Ostrea opercularis* Linnaeus, 1758; Recent, E Atlantic.

Aequipecten (*Perapecten*) Wagner, 1985: 84. Type species (OD): *Pecten commutatus* Monterosato, 1875 [= *n.n.* for *Pecten philippii* Récluz, 1853 (*non Pecten philippii* Michelotti, 1839)]; Recent, NE Atlantic and Mediterranean. **Syn. n.**

Lindapecten Petuch, 1995: 40. Type species (OD): *Pecten muscosus* Wood, 1828; (sub)tropical W Atlantic. **Syn. n.**

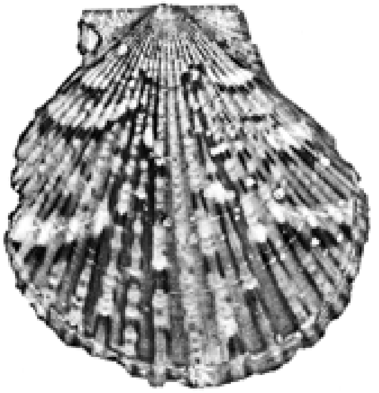
Remarks: Wagner (1985) introduced *Perapecten* as a subgenus of *Aequipecten*, but subsequently (1991: 42) raised it to generic status. However, morphological characters (notably macro- and microsculpture, and auricular crura) are similar to those of *Aequipecten.* Petuch (1995: 40) considered that *Perapecten* differed from *Aequipecten* mainly in having more erect spines on the radial costae. This is a very variable character, which can be observed within various species of *Chlamys* and *Mimachlamys*. Furthermore we believe that all significant morphological characters in *Lindapecten* and *Aequipecten* are identical.

Representative Recent species of *Aequipecten* are: *A. commutatus* (Monterosato, 1875) from the (sub)tropical E Atlantic, *A. exasperatus* (G. B. Sowerby 2nd, 1842) from the Caribbean region; *A. flabellum* (Gmelin, 1791) from the tropical E Atlantic; *A. glyptus* (Verrill, 1882) from the (sub)tropical W Atlantic; *A. muscosus* (Wood, 1828) from the (sub)tropical W Atlantic; *A. opercularis* (Linnaeus, 1758) from the boreal to subtropical E Atlantic, and *A. tehuelchus* (d'Orbigny, 1847) from the (sub)tropical SW Atlantic.

Aequipecten commutatus peripheralis subsp. n.

(Figs 46–48)

Description of holotype (LV): Shell rather compressed, up to *ca.* 20 mm high, suborbicular, higher than wide, inequilateral (posteriorly obliquely ovate), auricles slightly unequal in size, umbonal angle 90°. LV sculptured with 19 radial costae, solid and nearly smooth, anteriorly and posteriorly secondary 3–4 radial riblets, preradial stage of granular microsculpture, radial stage with very weak interstitial microscopic antimarginal striae near ventral margin, interstitial commarginal lamellae, commencing at early radial stage and extending to central part of disc. Auricles with 7 scaly radial



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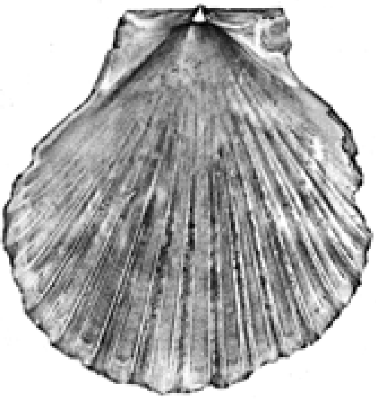

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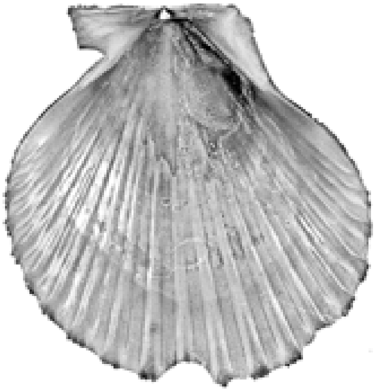

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Figs 46–48. *Aequipecten commutatus peripheralis* subsp. n. 46–47. Holotype, NMSA E8964, off Matigulu R., Zululand, 200–220 m, 19.4 x 18.4 mm. 46. LV exterior. 47. LV interior. 48. Paratype, NMSA E8964, same loc., 19.4 x 18.3 mm, RV interior.

riblets, anterior auricle marginally repaired. Hinge line straight. Interior marginal carinate. Prominent auricular crura. Resilifer triangular, slightly oblique. Colour creamy with white and orange spots and streaks (V-shaped markings). Dimensions of holotype: height 19.4 mm, length 18.4 mm, depth (one valve) 2.7 mm).

Additional description of paratypes (E8964): RV more convex than holotype, up to *ca.* 30 mm high, usually smaller, suborbicular, inequilateral. Auricles slightly unequal (anterior larger than posterior). Interstitial commarginal lamellae usually extending to ventral margin. Macrosculpture more prominent than in holotype, radial ribs near ventral margin sometimes tripartite. Anterior auricle of RV with more prominent radial riblets than on posterior. Byssal fasciole small, byssal notch obsolete. Active ctenolium with 3–5 teeth. Coloration of RV weaker.

Type locality: SOUTH AFRICA: *Zululand*: off Matigulu River mouth, 29°21.9'S, 31°56.2'E, 200–220 m, bottom of mud, coarse sand and *Dendrophyllia*, dead, NMDP Stn ZR9, 16.vi.1989.

Type material: Holotype NMSA E8964/T1731, data as above, 1 LV.

Paratypes (44 LV, 64 RV): SOUTH AFRICA: *Zululand*: off Matigulu River mouth, 300 m, soft mud, dead (NMSA E8875/T1733: 2 LV); same loc., 200–220 m, mud, coarse sand, *Dendrophyllia*, dead (MNHN: 1 LV, 1 RV; NMSA V7830/T1732: 15 LV, 28 RV; ZMA Moll. 3.99.004: 1 LV, 1 RV). *Transkei*: off Whale Rock, 430–450 m, fine muddy sand, dead (NMSA C8887/T1734: 2 LV); same loc., 500 m, fine sandy mud, dead (NMSA C9242/T1735: 1 LV); same loc., 350 m, fine muddy sand, dead (NMSA C9408/T1736: 1 RV); same loc., 250–280 m, sand and shell rubble, dead (NMSA C8620/T1737: 1 LV); off Mendu Point, 300 m, coarse sand, dead (NMSA C6548/T1738: 1 RV); same loc., 250 m, coarse sand, rubble, few sponges, dead (NMSA C6393/T1739: 3 RV); off Qolora River, 290–300 m, fine muddy sand, broken shell, dead (NMSA C6983/T1730: 3 LV, 1 RV); off Qora River, 400 m, sand, dead (NMSA C4898/T1741: 15 LV, 20 RV); off Kei River, 390 m, coarse sand, dead (NMSA C3854/T1742: 2 LV, 8 RV).

Distribution: Continental slope of KwaZulu-Natal and Transkei, South Africa.

Habitat: Bathyal (200–500 m) on soft sediments (mud, muddy sand or sand). No live specimens have been collected.

Discussion: *A. commutatus peripheralis* differs only in small degree from *A. commutatus commutatus* (Monterosato, 1875) of the Mediterranean and W. Africa, but the two populations are widely allopatric. In the south-east African population the shell is less solid, more obliquely elongated, the RV more depressed, and with a finer sculpture of commarginal lamellae; also interstitial secondary radial riblets (1–2 per interval) are sometimes present near the ventral margin of the LV. Worn juveniles can be easily confused with *Cryptopecten bullatus* (Dautzenberg & Bavay, 1912), but the latter has more numerous radial costae (22–24) and is ornamented with vesicular radial costae.

Etymology: *peripheralis* = at the periphery - alluding to its origin as a population of *A. commutatus* now isolated on the extreme periphery of its previous range.

Genus *Cryptopecten* Dall, Bartsch & Rehder, 1938

Cryptopecten Dall, Bartsch & Rehder, 1938: 84, 93. Type species (OD): *Cryptopecten alli* Dall, Bartsch & Rehder, 1938 [= *Pecten* (*Chlamys*) *bullatus* Dautzenberg & Bavay, 1912]; Recent, Hawaii.

Cryptopecten bullatus (Dautzenberg & Bavay, 1912)

(Fig. 49)

Pecten (*Chlamys*) *bullatus* Dautzenberg & Bavay, 1912: 17, pl. 27, figs 1–2. Type locality: Sulu Archipelago, Philippines, 6°08'N, 121°19'E, 275 m.

Cryptopecten bullatus; Hayami, 1984: 96, pl. 1, figs 1—6, pl. 2, figs 1–3, pl. 9 fig. 1, pl. 10, fig. 3, pl. 11, fig. 3 (references, description, distribution); Dijkstra & Marshall, 1997:105, pl.12, figs 1–5 (references, synonymy, type data, distribution, discussion).

Chlamys (*Cryptopecten*) *bullata*; Lussi, 1995: 1, 2, fig. 11.

Cryptopecten alli Dall, Bartsch & Rehder, 1938: 93, pl. 23, figs 1–4, 7; Abbott & Dance, 1982, 308, holotype figured. Type locality: S coast of Oahu, Hawaii, 436–461 m.

Cryptopecten complanus Wang, 1983: 402, 405, figs 1.1–7. Type locality: East China Sea, 31°05'N, 128°00'E, 147 m.

Description: Shell small, height to *ca.* 25 mm (average *ca.* 20 mm), thin, inflated, suborbicular, somewhat oblique, RV slightly more convex than left, inequilateral, auricles unequal, umbonal angle *ca.* 100–110°. Prodissoconch *ca.* 230 µm in height.

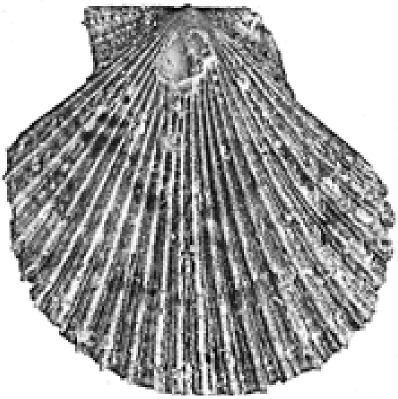


Fig. 49. *Cryptopecten bullatus* (Dautzenberg & Bavay, 1912): NMSA D1485, off Amanzimtoti, Natal, 160–170 m, 16.1 x 16.0 mm, LV exterior.

Both valves sculptured with 17–20 squamose, bivesicular costae (commonly 18–19). Interstices commonly narrower than costae, commarginally lamellate (finer on RV). Anterior auricle slightly larger than posterior one, with 2 prominent radial riblets and 2–4 interstitial ones; posterior auricle with one strong radial riblet and 3–5 smaller ones between disc margin. Inner surface strongly plicate. Hinge line straight. Byssal fasciole moderately small, byssal notch rather deep. Active ctenolium with 4–5 teeth on suture. Resilifer elongate triangular. Colour variable, commonly reddish brown with pale oblique or zigzag stripes or blotches, sometimes uniform yellow or purple.

Type material (all seen by HD): *P.* (*C.*) *bullatus*: holotype ZMA Moll. 3.12.006, 2 paratypes ZMA Moll. 3.12.007. *C. alli:* holotype USNM 173.194. *C. complanus*: holotype IOAS M11.072, paratype IOAS M11.073.

Regional data: *Natal*: off Amanzimtoti, 160–170 m, medium sand, dead (D1485).

Distribution: Throughout the W, SW and central Pacific, also known from the W Indian Ocean, south-western limit southern KwaZulu-Natal.

Habitat: Sublittoral to bathyal depths, living between coral rubble on sandy substrates.

Remarks: The convexity and sculpture of *C. bullatus* vary with its bathymetric range and geographic distribution. For further discussion see Hayami (1984: 98), Wagner (1989: 61) and Dijkstra (1991: 36).

Cryptopecten nux (Reeve, 1853)

(Figs 50–51)

Pecten nux Reeve, 1853: pl. 32, fig. 143, *erratum*.. Type locality: Panglao, Bohol, Philippines (des. Wagner 1989).

Cryptopecten nux; Wagner, 1989: 56, figs 6–9 (lectotype) 17–18; Dijkstra & Marshall, 1997:107 (references, synonymy, type data, distribution); Dijkstra & Knudsen, 1998: 86 (further references and synonymy, pl. 3, figs 12–13).

Cryptopecten nux nux; Hayami, 1984: 100, pl. 2, fig. 4, pl. 3, figs 1–2, pl. 9, figs 2–5, pl. 12, figs 1–2 (references, synonymy, type data, description, distribution, discussion).

Pecten guendolenae Melvill, 1888: 279, pl. 2, fig. 6. Type locality: Mauritius.

Chlamys guendolenae; Wagner, 1989: 58, figs 10 (holotype), 11–13, 17–18 (description, discussion).

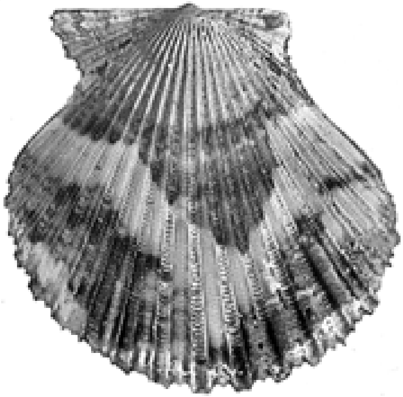
Chlamys bullatus (*non* Dautzenberg & Bavay, 1912); Barnard, 1962: 254; *idem*, 1964: 429, fig. 14c; *idem*, 1974: 760.

Chlamys (*Cryptopecten*) *bernardi* (*non* Philippi, 1851); Oliver, 1992: 72, 76, text figs 21a–b, pl. 14, figs 3a–b.

Description: Shell height to 20 mm high (average 10–15 mm), solid, RV more convex than LV, orbicular to suborbicular, equilateral to inequilateral, auricles unequal, umbonal angle *ca.* 90°. Both valves with 18–22 regularly spaced, vesicular sculptured radial ribs, when worn appearing more tripartite, internals with commarginal lamellae. Auricles with 4-6 spiny sculptured radial ribs, strongest on anterior auricle of RV. Hinge line straight. Byssal fasciole moderately wide, byssal notch deep. Active ctenolium with 4–6 teeth on suture. Inner surface crenulated near periphery. Cardinal crura well developed. Resilifer triangular, slightly oblique. Colour strongly variable, whitish, creamy or yellowish with red, pink, purple or brown maculations, LV more strongly pigmented, sometimes uniform yellow or purple.

Type material: see Dijkstra & Knudsen (1998).

Regional data (all NMSA: NMDP, unless otherwise stated, selected records only): SOUTH AFRICA: *Zululand*: NE of Kosi Bay, 65 m, fine sand, dead (S6725); off Kosi Bay, 45 m, fine muddy sand, dead (D6040); same loc., 52 m, lithothamnial pebbles, algae, dead (S7805); SE of Kosi Bay, 41 m, lithothamnial pebbles, coarse sand, dead (S7385); same loc., 40 m, fine sand, dead (D8783); same loc., 50 m, fine sand, shell rubble, *Codium*, live (D7311); same loc., 50 m, fine, slightly muddy sand, dead (D8322); off Boteler Point, 70 m, coral rubble, dead (D6416); same loc., 70 m, some coarse sand, some shell rubble, dead (D7413); same loc., 44 m, sponges, shell, dead (S4476); same loc., 58–61 m, sand, pebbles, dead (S4209); SE of Rocktail Bay, 60 m, coarse sand, dead (S5271); NE of Lala Nek, 66–71 m, coarse sand, sandstone rocks, dead (S6109); NE of Lala Nek, 60 m, coarse sand, dead (S5579); off Lala Nek, 75 m, coarse sand, sandstone, coral, dead (S5843); SE of Lala Nek, dredged, dead, 74 m, sandstone rocks, dead (S7244); off Hully Point, 50 m, fine sand, live (D7554); off Gobey's Point, 55–60 m, sand, shell rubble, live (D7175); off Sodwana Bay, 70-120 m, dead (D1513: A. D. Connell); same loc., 70 m, coral rubble, dead (S3899); same loc., 70 m, dead coral



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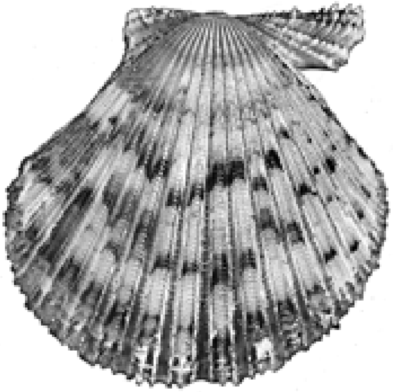

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Figs 50–51. *Cryptopecten nux* (Reeve, 1853): NMSA D7311, SE of Kosi Bay, Zululand, 50 m, pv, 15.5 x 15.9 mm. 50. LV exterior. 51. RV exterior.

rubble, dead (S4561); same loc., 49–53 m, sand, live (S4754); SE of Sodwana Bay, 64 m, sand, live (S4419); off Matigulu River mouth, 70 m, coarse sand, broken shell, dead (S744). *Natal*: off Sheffield Beach, 50 m, fine sand, dead (E9598); off Durban, 50 m, dead (B4106: A. D. Connell); off Amanzimtoti, 115–125 m, medium sand, dead (D1264); same loc., 160–170 m, medium sand, dead (D1485); off Mtamvuna River, 45 m, fine sand, gorgonians, dead (D3700). *Transkei*: SE of Mtamvuna River, 50 m, fine sand, dead (D3653); off Nthlonyane River, 80 m, sand, broken shell, dead (C2586); off Mendu Point, 250–260 m, coarse sand, dead (C4939); off Sandy Point, 90 m, calcareous debris, coarse sand, dead (C4532); off Qolora River, 96 m, gorgonians, sponges, dead (C4656); off Kei River, 138 m, coarse sand, dead (C5084).

Distribution: Throughout tropical and subtropical Indo-West Pacific (absent from Hawaii), south-western limit western Transkei.

Habitat: Living byssally attached to rocks or coral, or on sediments or coral rubble on sandy bottoms at littoral to bathyal depths.

Remarks: *C. nux* is rather variable in outline, convexity, sculpture and colour (Hayami 1984:100; Dijkstra 1991: 37). Type material of *P. guendolenae*, *C. smithi* and *C. corymbiata* is morphologically similar to *C. nux.* Wagner (1989: 58) considered *C. guendolenae* to be a valid species, but Hayami (1984: 102) and Dijkstra (1991: 37) regarded it as a synonym of *C. nux*. *C. bernardi* (Philippi, 1851) from French Polynesia is larger in size (up to 25 mm high), more triangular in shape (when mature) and more convex, and has finer sculpture than *C. nux.* However, it is possible that the type material of *C. nux* consists of young specimens of *C. bernardi.* Similar material has been observed from French Polynesia (HD, MNHN, NNM, ZMA) (under study).

South African material, misidentified by Barnard (1964: 429) as '*Chlamys bullatus* Dautzenberg & Bavay', is in all features similar to *C. nux.*

Genus *Haumea* Dall, Bartsch & Rehder, 1938

Haumea Dall, Bartsch & Rehder, 1938: 86. Type species (OD): *Haumea juddi* Dall, Bartsch & Rehder, 1938 (= *Pecten loxoides* G B. Sowerby 2nd, 1882); Recent, Hawaii Islands, 7–15 m.

Haumea minuta (Linnaeus, 1758)

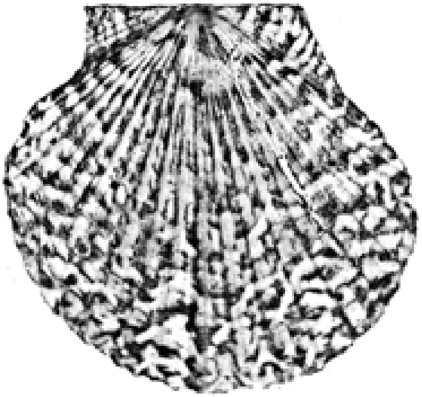
(Figs 52–53)

Ostrea minuta Linnaeus, 1758: 696; Dijkstra, 1999: 397, fig. 8c (lectotype). Type locality: 'in Oceano Indico'.

Pecten inaequivalvis G. B. Sowerby 2nd, 1842: 50, pl. 19, figs 193–195; Reeve, 1852: pl. 1, figs 1, 6; Deshayes *in* Maillard, 1863: 31; von Martens, 1880: 138; Melvill & Standen, 1898: 46. Type locality: Philippine Islands.

Haumea inaequivalvis; Dijkstra & Kastoro, 1997: 275, fig. 150 (references, type data, description, distribution, discussion).

Description: Shell up to 30 mm high, orbicular (juvenile), obliquely suborbicular (mature), RV more convex than LV, inequilateral, auricles unequal, umbonal angle *ca.* 100–110°. Both valves with regularly spaced, prominent radial costae (18–20). Radial ribs near antero- and postero-margins weakly commarginally striated. Intervals with closely spaced commarginal lamellae. Anterior auricle larger than posterior. Auricles with weak radial riblets (2–4). Inner surface strongly plicated near ventral margin. Hinge line straight. Byssal fasciole narrow, byssal notch moderately deep. Resilifer oblique, triangular. Active ctenolium weak with 4–5 teeth on suture. Colour of LV black grey or



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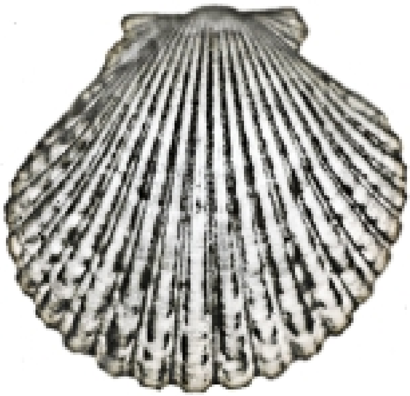

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Figs 52–53. *Haumea minuta* (Linnaeus, 1758): NMSA H4962, Lunga Bay, Mozambique, 18 m, pv, 28.2 x 29.9 mm. 52. LV exterior. 53. RV exterior.

reddish-brown, marked with few white spots and black or red streaks, RV more uniform whitish, creamy or pale brown.

Type material: *Ostrea minuta:* lectotype UUZM 158 (designated Dijkstra 1999). *Pecten inaequivalvis*: lectotype BMNH 1994126/1, designated by Dijkstra & Kastoro (1997: 276); 2 paralectotypes BMNH 1994126/2-3.

Regional data (selected records only, all NMSA unless otherwise stated): MOZAMBIQUE: Pemba, 18–20 m, sandy bottom, live (HD6625); SW Lunga Bay, 18 m, muddy gravel, *Thalassodendron*, live (H4962: K. J. Grosch); SW Conducia Bay, *ca.* 9 m, from gravel and sparse *Thalassodendron*, dead (H4966: K. J. Grosch). SOUTH AFRICA: *Zululand* (all NMSA, unless otherwise stated): off Kosi Bay, 45 m, fine muddy sand, dead (D6040); SE of Kosi Bay, 50 m, fine muddy sand, dead (D7851); same loc., 45–50 m, fine sand, algae, gorgonians, dead (D8871); same loc., 40 m, fine sand, dead (D8783); same loc., 40 m, shell rubble, dead (D8129); same loc., 50 m, coarse sand, shells, dead (D6975); same loc., 50 m, fine, slightly muddy sand, dead (D8331); off Hully Point, 50 m, fine sand, live (D7554); same loc., 60 m, shell rubble, dead (D6708); off Jesser Point, 42 m, medium sand, dead (D8548); same loc., 40 m, shell rubble, dead (D7146); off Sodwana Bay, 49–53 m, sand, live (S4754); off Cape Vidal, 75–80 m, broken shell, dead (E4524). *Natal*: Durban Bay, shallow dredgings, dead (A1737: RK).

Distribution: Throughout tropical Indo-Pacific, except Red Sea and Hawaii.

Habitat: Free-living (perhaps in colonies) on sandy or muddy sand bottoms with rubble or sediments at littoral to sublittoral depths. [*H. loxoides* from Hawaii lives in dense colonies on beds of sand at 15 m depth (Calabrese & Cook 1970: 3; Earle 1985: 4)].

Remarks: The present specimens from Mozambique and South Africa resemble the type material of *Pecten minuta* and *P. inaequivalvis*, although coloration is somewhat paler.

This species has not previously been recorded from Mozambique or South Africa.

Haumea loxoides from Hawaii is very similar to *H. minuta*, but has a more fragile and oblique shell. Juveniles of *H. minuta* could be confused with *Haumea rehderi* (Grau, 1960), a small species (maximum height *ca.* 5 mm), occurring throughout much of the tropical Indo-West Pacific; it has more prominent radial costae with more widely set commarginal lamellae in their intervals.

Genus *Volachlamys* Iredale, 1939

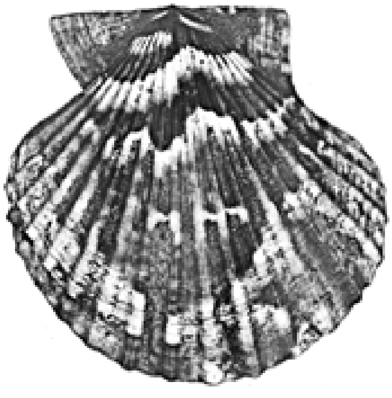
Volachlamys Iredale, 1939: 356. Type species (OD): *Pecten cumingii* Reeve, 1853; Recent, Moreton Bay, Queensland.

Volachlamys fultoni (G. B. Sowerby 3rd, 1904)

(Figs 54–55)

Chlamys fultoni Sowerby, 1904: 2, pl. 7, fig. 5; E. A. Smith, 1906: 59; Barnard, 1964: 428, fig. 14a; Boshoff, 1965: 134, pl. 14, fig. 7; Kilburn & Rippey, 1982: 171, pl. 38, fig. 11. Type locality: 7.5 mi. 'N. W.' (= SE) of Conical Hill, Amatikulu, Zululand, South Africa, 26 fath. (= 48 m), muddy bottom.
Pecten fultoni; Hayami, 1985: 5.
Volachlamys fultoni; Anonymous 1991: 2, fig. 6; Rombouts, 1991: 62, pl. 5, fig. 6.
Argopecten fultoni; Steyn & Lussi, 1998: 212, fig. 857.
Chlamys eucosmia (*non* Turton, 1932); Boshoff, 1965: 136, pl. 14, fig. 9.

Description: Shell up to 40 mm high, usually somewhat smaller, compressed, suborbicular, nearly equivalve, equilateral, auricles slightly unequal, umbonal angle *ca.* 90°. Both valves with numerous prominent radial plicae (16–18, usually 17), which are somewhat squamose near ventral margin, and fine, closely spaced, commarginal lamellae in interstices on RV and in late ontogeny on left; granular microsculpture in interstices and sometimes on posterior auricle of LV; lamellae and microsculpture variable in development, sometimes almost absent (Barnard 1964: 429). Auricles with 5–7 small radial riblets, somewhat nodulous, and fine, closely spaced, commarginal lamellae on anterior auricle of LV, more coarsely laminated on anterior auricle of right. Byssal fasciole moderately wide, byssal notch deep. Active ctenolium well developed with 4–6 teeth on suture. Inner surface slightly plicated to more angulated near ventral margin. Cardinal crura weak. Resilifer oblong, oblique; resilial denticles absent. Colour variable, creamy-brown, purplish-brown with white or cream blotches or streaks, sometimes almost uniform brown or white.



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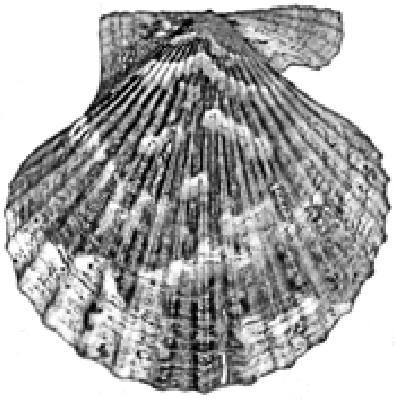

55

Figs 54–55. *Volachlamys fultoni* (Sowerby, 1904): HD 5826, Catembe, Mozambique, pv, 34.5 x 35.0 mm. 54. LV exterior. 55. RV exterior.

Type material: Lectotype (H 33.5 mm, L 33 mm, D 11 mm) BMNH 1904.12.23.164 herein designated; paralectotype (LV) SAM 14970.

Regional data: MOZAMBIQUE: off Maputo, 120 m, muddy sand, live (HD6471); Maputo, beach drift (5004); Beira, reclamation dump, dead (J5112, G8177: E. Roscoe). SOUTH AFRICA: *Zululand*: off Neill Peak (Cunge), 50 m, mud, dead (E3881); Tugela Bank, 41 m, fine mud, dead (A7158); off Matigulu River mouth, 70 m, coarse sand, broken shell, dead (S744); off Tugela Bluff, 60–65 m, mud, dead (E9060). *Natal*: off Mvoti River mouth, 70 m, soft mud, dead (E9159); off Sheffield Beach, 50 m, fine sandy mud, dead (E9247); same loc., 50 m, fine sand, dead (E9598); SE of Sheffield Beach, 50 m, sandy mud, dead (E5082); off Tongaat Bluff, 50 m, mud, dead (E9941); same loc., 50 m, soft mud, algal debris, dead (S180, S181); off Durban, 274 m, dead (9934); Durban Bay, shallow dredgings (B1663); off Isipingo, 55 m, dead (B3045); off Umlaas Canal, 50 m, fine sand, dead (D1046). TRANSKEI: off Mbotyi, 45 m, mud, dead (C7129); off Mzimhlava R., 50 m, clay, thick mud, dead (C7120); off Mgazi, 48 m, mud, dead (C3268); off N'tafufu River, 50 m, mud, sand, dead (C1039). *Eastern Cape region*: off East London, 70 m, muddy sand, schizamminid forams, dead (B8330); same loc., 70 m, muddy sand with lumps of black mud, dead (B8274); same loc., 70 m, fine sand, broken shells, dead (B8414, B8460).

Distribution: Central Mozambique to the eastern Cape, South Africa, also Malagasy Republic.

Habitat: Living byssally attached to rocks, or free, on muddy bottoms on continental shelf, living mainly in 40–70 m, sometimes deeper.

Remarks: A specimen identified as *Chlamys eucosmia* in the Boshoff collection in NMSA is actually a juvenile of the present species.

Volachlamys fultoni closely resembles *V. tranquebaria* (Gmelin, 1791) from N and NE Indian Ocean, but the latter species is more convex and more oblong, and is sculptured with more numerous radial plicae (18–20) but fewer secondary interstitial radial riblets; it is also more brightly coloured. Granular microsculpture is also present in early ontogeny in *V. tranquebaria*, and (more strongly) in *V. cumingii* (Reeve, 1853). Smooth individuals such as occur in the Japanese *V. hirasei* (Bavay, 1904) have never been observed in *V. fultoni*.

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